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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL,

1883—1884.

LONDON:
PRINTED BY EYRE AND SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1884.

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1883—1884.

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Office

MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL.

1883—84.

116, *Victoria Street, April* 14, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (March 28) were read and confirmed.

Read—The following letter:—

M.O. 731.

Downing Street, March 31, 1883.

SIR,

I AM directed by the Secretary of State for the Colonies to inform you that he is at present engaged in selecting an assistant to Dr. Doberck, who has been appointed Director of the new Hong Kong Observatory.

The particulars of the appointment, and the qualifications required, are given in the enclosed paper, and his Lordship would feel much obliged if the Meteorological Council should be able to recommend a suitable candidate for this post.

I am to state that a similar application has been made to the Secretary of State for War, who has been requested to recommend a duly qualified non-commissioned officer of the corps of Royal Engineers, but that it seems doubtful whether it will be possible to find such a candidate, and that Lord Derby has been informed that Mr. Figg, who, he understands, is now employed at the Kew Observatory, would be willing to accept the post, if offered to him.

I am to add that Lord Derby desires to afford Dr. Doberck the opportunity of satisfying himself as to the qualifications of the person selected as assistant before any appointment is made.

I am, &c.

The Secretary to the Meteorological Council. (Signed) JOHN BRAMSTON.

It was resolved that a communication (Letter 816) be addressed to the Superintendent of Kew Observatory, inquiring if the Kew Committee see any objection to the appointment of Mr. Figg to the post in question. If no objection be made, the Secretary is instructed to forward a recommendation of Mr. Figg to the Colonial Office, with copy of Mr. Whipple's letter.

Read—The following letter:—

M.O. 787.

Royal Cornwall Polytechnic Society,
Falmouth, April 6, 1883.

SIR,

I BEG to inform you that your letters of the 21st February last and the 15th March last, addressed to Mr. W. L. Fox, Hon. Sec. to the Meteorological Sub-Committee, stating the intention of the Meteorological Council to discontinue the annual grant to the Falmouth Observatory, have been laid before the General Committee of this Society.

In reply to the last-named letter, I am requested by the General Committee to ask the Meteorological Council kindly to consent to receive a deputation from the Polytechnic Society, with a view to their urging a continuance of the annual grant of 250*l.* to the Falmouth Observatory, and also to

inform the Council that the officers and friends of this Society will, with others, be invited to attend.

The General Committee respectfully beg for an early reply, in order that the necessary arrangements may be made.

I am, &c.
(Signed) EDWD. KITTO,
Secretary.

To R. H. Scott, Esq., M.A., F.R.S.,
Secretary to Meteorological Council.

The Secretary was instructed to send the following reply (Letter 832) :—

M.O. 787.

SIR April 17, 1883.

THE Meterological Council have had under consideration, at their last meeting, your letter of the 6th instant, and in reply I am desired to inform the Royal Cornwall Polytechnic Society that the question of the maintenance of the self-recording observatories, established by the Meteorological Committee in 1867, was very carefully considered, after consultation with authorities whose opinions were held to be of most weight on such a subject, both in this country and abroad, with the result before communicated to the Society, (viz.) that of the seven observatories, three only should be maintained in future. In accordance with this conclusion, which was based on a consideration of the scientific objects in view, and the numerous claims upon the grant administered by the Council, it was settled that the observatories to be retained should be those at Valencia, Kew, and Aberdeen, those at Falmouth, Stonyhurst, Armagh, and Glasgow being discontinued. From this decision the Meteorological Council, after full re-consideration, sees no reason to recede, and they cannot, therefore, hold out any hope to the Society that any useful result would be obtained by their receiving a deputation of the Society to discuss the matter.

At the same time, if the Society still think fit to press for an interview, the Council will not decline to consent to it, but they request that, in this event, the Society will previously submit in writing a statement of the arguments they propose to urge on the Meteorological Council.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Secretary,
Royal Cornwall Polytechnic Society,
Falmouth.

Read—The following letter (M.O. 625) :—

SIR, Lloyd's, March 16, 1883.

I BEG to inform you that the Committee of Lloyd's have established or are establishing signal stations at the following points :—

Southend Pier.	Spurn Point.
Deal.	Cromer.
Dover.	Brow Head (Crookhaven, Ireland).
Dungeness.	Roche's Point (Queenstown, Ireland).
Beachy Head.	Malin Head (Co. Donegal, Ireland).
St. Catherine's Point (Isle of Wight).	Rathlin Island (Co. Antrim, Ireland).
Hurst Castle.	Kildonan (Mouth of the Clyde, Scotland).
The Lizard.	Wick, N.B.
Scilly Islands.	Scrabster, N.B.
Lundy Island.	Peterhead, N.B.
St. Ann's Head (Milford Haven).	Aberdeen, N.B.

It appears possible that it might be advantageous to the shipping interests if arrangements could be made by which cones of warning could be hoisted at these stations, so that vessels may be made aware of cautions in passing the stations.

I should be much obliged if you would kindly inform me whether you consider such an arrangement could be carried out.

The Committee would be willing to supply the necessary flagstaff and allow their signalmen to do the work. Most of the stations are connected by telegraph wire with the telegraphic system of the country, and thus it would appear that the only arrangement necessary would be that instructions should be sent from the Meteorological Office to the signalmen in charge, and that the proper cones for hoisting should be provided.

I am, &c.
(Signed) H. M. HOZIER,
Secretary.

The Secretary,
Meteorological Office.

Mr. Scott stated that the proprietors of the "Shipping Gazette" had also established similar signal stations (Letter 829) at—

Prawle Point.	Dungeness.	Grimsby.
Portland Bill.	Aldborough.	Flamborough.
Yarmouth (Isle of Wight.)	Great Yarmouth.	The Old Head of Kinsale.

The Secretary was instructed to reply to Lloyd's (Letter 882), to the effect that the Council are not prepared to accept the responsibility of issuing warnings such as are

suggested, without more definite knowledge that they would be desired by the owners and masters of ships. The distinctions between the warnings now issued to the coasts and those proposed by Lloyd's should at the same time be pointed out.

It was resolved, at the suggestion of the Hydrographer, that a special report on the gale of March 6 in the North Sea should be prepared.

Read—The following letter (Minutes, 1882, p. 109) :—

M.O. 739.

The Central News, Limited, 6, Ludgate Circus,
London, April 2, 1883.

DEAR SIR,

I HAVE carefully considered the question of taking news for the country papers, and I think the latest time we ought to have the message in this office would be 11 o'clock. Some provincial newspapers go to press at half-past 12, and this would not leave much time for catching those editions. Most papers, however, publish an edition for their town, which is not printed until 5 o'clock in the morning, and we could, of course, take the forecast very much later for those editions, but they do not comprise the whole issue of the papers.

I am, &c.
(Signed) FRANCIS DUFF,
Manager.

R. H. Scott, Esq.,
Meteorological Office,
116, Victoria Street, Westminster.

Read Letter 724, from Captain Abney, enclosing some measurements made with the cloud camera (Minutes, 1882, p. 99).

The Secretary was instructed to thank Captain Abney for the information, and to express the hope that he would soon be able to send the instrument to Kew.

Mr. Galton submitted rough models and a memoir by himself on a method of determining the distance and height of clouds, and the direction and rate of their motion parallel to the Earth's surface.

HE supposed three observers and three instruments on stands, one of these being a "Finder" having a pair of parallel sights, and mounted like a rude theodolite, the others each consisting of a tube laid horizontally in Y-shaped supports, and having a graduated circle, with attached arm and sights, fixed flat against one of its projecting ends.

At the beginning of the measurement all three observers stand at the middle station where the Finder is mounted. Two of them look simultaneously through it, and fix upon a recognisable spot or interspace in the cloud. They then hurriedly separate, and hasten, the one to the right and the other to the left, to their respective stations, where their angular instruments have been so laid that the axes of their tubes lie in the same straight line. Each observer quickly rotates the tube of his instrument and turns the arm with the sights, until he aligns the latter with the cloud-spot. He then continues to keep the sights upon the spot, and to follow its motion, until he receives a signal to stop, which is given by a whistle from the third observer, who remains at the middle station. Observations of the same cloud-spot are thus made simultaneously from the two ends of a long base, and the angles shown by the circles are the basal angles of a triangle, whose base is the line separating the two stations and whose apex is the cloud-spot.

The third observer, immediately after his companions have started towards their respective stations, goes to the "Finder," and re-adjusts it, if not to identically the same spot that had been selected, at all events to one closely adjacent, and he notes the time. He then reads off the altitude and azimuth of the spot. After he has given the signal whistle he repeats the process. Thus he obtains the altitude and azimuth of the same cloud-spot at the beginning and at the end of a known interval of time, the latter of which is practically identical for purposes of calculation with the moment at which the observations to determine the distance of the cloud were made.

Professor Stokes brought forward certain proposals and suggestions as to the use of the Harmonic Analyser.

Read—The following letter (Minutes, p. 108) :—

M.O. 786.

Scottish Meteorological Society,
Albert Buildings, 6, Shandwick Place,
Edinburgh, April 5, 1883.

DEAR SIR,

I AM directed by the Council of the Society to convey to the Meteorological Council their very cordial thanks for the grant of 100*l.* towards meeting the expenses incurred in connexion with observations made on Ben Nevis during last summer.

I am happy to be able to say that subscriptions for establishing the observatory are coming in in a fairly satisfactory manner.

A telegraph wire to the top of the Ben will be part of the essential equipment of the observatory.

I am, &c.
(Signed) T. SANDERSON,
Hon. Treasurer.

R. H. Scott, Esq.

Submitted—The following report:—

SIR, Meteorological Office, March 31, 1883.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st March 1883.

The charts of sea surface temperature remain in Mr. Malby's hands, and I have been occupied in the general supervision of the printing, the examining and correcting proofs, and drawing the lines of equal temperature.

I have further examined the temperature of the sea surface for the ocean district adjacent to Cape Guardafui in the months of May and June (referred to in my last report, Minutes 1882, p. 79), and find that a larger number of observations than are at present available are required.

I have also revised and re-drawn the charts showing the temperature of the sea surface round the British Islands for each month of the year.

My spare time, when not engaged on the charts of sea temperature has been devoted to the barometer charts, and some progress has been made in drawing isobars over the Indian Ocean for the month of November.

I hope to lay before the Council some of the results of this work during the next quarter.

I am, &c.

Captain H. Toynbee, F.R.A.S.,
Marine Superintendent.

(Signed) C. W. BAILLIE,
Navg. Lieutenant, R.N.
H. T.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 12 logs had been received, 8 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. S. H. Bolton	S.S. "Tyne Queen."	Jan. 3—April 7, 1883.	Newport, Gibraltar, Shields, and Palomares.	—
Capt. C. M. Hepworth.	S.S. "Danube"	Jan. 6—Mar. 25, 1883.	Plymouth, Natal, and home.	1882, p. 75.
Capt. A. W. Jeffery	S.S. "Ptolemy"	Jan. 4—Mar. 26, 1883.	Rio Janeiro, New York, and home.	1882, p. 79.
Capt. J. Lawson	S.S. "Minto" S.S. "Humber."	July 24, 1882—Feb. 20, 1883.	Brazils, Rio de la Plata, Barbadoes.	1882, p. 42.
Capt. A. M'Dougall	"Auckland"	June 20, 1882—Mar. 27, 1883.	London, Otago, and home	—
C. F. Oldham, Lieut. in command; Alexander Leeper, Lieut.	H.M. Schooner "Lark."	Oct. 5, 1882—Feb. 5, 1883.	Surveying among Solomon Islands, and at Sydney, New South Wales, and Auckland, New Zealand.	—
T. Young	"City of Agra"	July 1, 1882—Mar. 5, 1883.	Melbourne and home	1881, p. 134.
Capt. W. H. Stuart	Sch. "Richmond"	Mar. 29—Aug. 1, 1882.	Tending lighthouses in Bahamas.	1880, p. 116.

Mr. Scott was instructed to present the sum of ten guineas to Captain Stuart, who had been an "excellent" observer for 11 years, and who was now retiring; to present the Charts (O. 27) to Capt. M'Dougall, those (O. 32) to Capt. Bolton and Mr. Leeper, and those (O. 43) to Mr. Oldham, and to convey the best thanks of the Council to the other observers.

Read—Letter No. 850, from Dr. Hann, accepting the records from the stations in Cyprus, for publication, as proposed by the Council (Minutes, 1882, p. 109).

The Secretary stated that the report of the meeting of the International Meteorological Committee which took place at Copenhagen in August 1882 was now ready for press, and he was authorised to have it printed as on previous occasions.

Submitted—The following reports of work for March 1883:—

MARINE ROOM.

Examined 18 new logs.

North Atlantic Weather Charts.

Preparation and charting of sea observations.

Simultaneous land observations for numerous stations received from foreign countries, and those in proximity to the sea have been prepared and plotted for August 1882.

Correspondence in connexion with despatch of forms and receipt of observations.

One person's time devoted to obtaining observations from ships arriving in London and Liverpool.

(Signed) CHAS. HARDING,
April 13, 1883.

The Marine Superintendent.

H. T.

TELEGRAPH (FORECAST and STORM WARNINGS) BRANCH, in addition to the DAILY ROUTINE WORK.

Rainfall Map of British Islands (*for the whole Year*) *from the* 15 *years of Observations* 1866–80.—Proof examined, re-considered, and somewhat altered.

Charts showing the Monthly Distribution of Mean Pressure over the British Islands, for 20 *years* 1861–80.—Six proofs received, four of them revised.

Charts, similar to above, but showing *Mean Temperature* instead of *Pressure.*—Six proofs received, two of them revised.

Mean Pressure values for 8 a.m., at stations in the Daily Weather Report.—Completed, except about three hours work.

Mean Temperature values for same stations and same period as above.—Three fourths done.

Checking of Storm Warnings, 1882.—Two thirds done.

Work has been much interrupted this month by the advent of Easter, so that for about a fortnight nothing but routine work could be attempted.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

Copper Plates pantagraphed.—8 plates, Nos. 28 to 35, 1878.

Zinc Plates.—Barograms, 6 plates, Nos. 36–41, 1878; Thermograms, 6 plates, Nos. 36–41, 1878; Vapour Tension, 6 plates, Nos. 32–37, 1878; Anemograms, 1 plate, No. 52, 1878.

Photographic Curves.—Barograms are prepared for pantagraphing as far as Plate 48; the thermograms are not in advance of the zinc plates.

Harmonic Analyser.—The analysis of the temperature curves for 1874 has been completed, and the barograms for 1876 commenced; in addition, some special results required by Professor Stokes have been obtained by the instrument.

Curves of hourly frequency and amount of rainfall, for each month of the year, and for the seven observatories, have been drawn.

I was occupied one day at the Law Courts on subpœna.

(Signed) R. H. CURTIS,
March 31, 1883.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM during the months of February and March, 1883.

The following curves and tabulations have been examined:—December (1881): *Barograms* four stations; *Anemograms,* five stations.

January (1882): *Thermograms,* three stations; *Barograms,* one station; *Anemograms,* five stations.

February (1882): *Anemograms,* one station.

The *Notes of Errors* and monthly report thereon, for December 1881, have been written out, and the examination of the rain work for Glasgow, Aberdeen, Falmouth, Stonyhurst, and Kew, for the year 1882 (with the exception of October already examined) for Mr Symons's return has been done.

I was absent on sick-leave for seven weeks, and Mr. Aldridge on special leave and holidays for eleven days during the period under notice.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary.

(Signed) T. E. ALLEN,
April 1, 1883.

Reported—That Mr. Baillie had stated (Letter 704) that Mr. R. F. Wallace had qualified for a rise of salary. An increase of 5*s.* per week was authorised, to date from March 28.

Submitted—The following list of instruments proposed to be ordered:—

	Estimated Cost. £	*s.*	*d.*
"A" a/c.			
100 thermometers - - - -	35	14	0
50 pairs maximum and minimum thermometers	60	0	0
25 screens - - - - -	13	10	0
"B T" a/c.			
100 thermometers - - - -	35	14	0
Total - -	£144	18	0

—Approved.

SUBMITTED—The following STATEMENT respecting the RECORDS for December 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

——	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :— Action	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good	Direction. Good.	Velocity. Bad.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good.	Direction. Good	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	*	*	0	0	0	0	†55	†55	0	0
Orientation verified	31st	—	31st	—	—	—	16th	—	12th	—	17	—	3rd	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	0	2	0	11	13	2	0	1	1	2	0
Result of 40 *Remeasurements* :—														
Greatest difference	0·0	1·0	1·0	1·0	—	—	0·0	2·0	0·0	1·0	0·0	1·0	1·0	1·0
Mean difference irrespective of sign	0·0	0·5	0·0	0·5	—	—	0·0	0·4	0·0	0·5	0·0	0·4	0·0	0·6
Residual difference (— Meteorological Office)	0·0	0·0	0·0	+0·1	—	—	0·0	−0·2	0·0	−0·2	0·0	−0·1	0·0	+0·2
RAIN GAUGE :— Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		7 hrs.		0		0		0		0	
„ „ other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		3		0		0		3		0		0	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Indifferent.	Bad.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	1 hr.	0	10 hrs.	0	0
,, ,, failure of light	0	0	0	0	0	4 hrs.	0
,, ,, other causes	0	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	3	0	2	7	4	0
,, calculating residual correction	0	0	0	6	1	0	0
,, applying residual correction	0	0	0	3	5	4	2
,, subtraction in subsidiary tables	0	1	2	2	2	1	1
,, tabulation by subsidiaries	0	0	0	0	0	0	0
,, ,, irregular differences	0	2	2	4	2	0	0
Result of 40 *Remeasurements* :—							
Greatest difference	·005	·005	·006	·008	·005	·005	·005
Mean difference irrespective of sign	·002	·002	·002	·003	·002	·002	·002
Residual difference (—Meteorological Office)	·000	·000	·000	·000	·000	+·001	·000
Mean monthly difference between simultaneous Barograph and Barometer readings	·002	·003	·001	·002	·002	·001	·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent.		Do.		Bad.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	14 hrs.	14 hrs.	2 hrs.	2 hrs.	0	0	0	0	0	0	0	0
,, ,, failure of light	0	0	0	0	0	0	0	0	2 hrs.	0	1 hr.	0	0	0
,, ,, imperfectly moistened bulbs	—	1 hr.	—	0	—	0	—	7 hrs.	—	0	—	0	—	2 hrs.
,, ,, partially frozen bulbs	—	36 hrs.	—	7 hrs.	—	20 hrs.	—	14 hrs.	—	19 hrs.	—	13 hrs.	—	1 hr.
,, ,, other causes	‡1 hr.	‡1 hr.	0	0	0	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of Standard	0	0	1	1	0	0	2	1	0	0	0	0	0	0
,, ,, by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, of subtraction in do. tables	0	0	0	0	0	0	3	1	3	1	0	0	1	1
,, ,, detected under glass scale	0	0	2	0	0	0	0	0	0	1	0	0	8	1
Result of 40 *Remeasurements* :—														
Greatest difference	0·2	0·2	0·1	0·2	0·3	0·2	0·3	0·2	0·2	0·2	0·2	0·2	0·2	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	—0·1	+0·1	0·0	+0·1	0·0	0·0	+0·1	—0·1	0·0	—0·1	0·0	0·0	+0·1	0·0
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0·1	0·2	0·2	0·2	0·1	0·1	0·2	0·1	0·1	0·1	0·1	0·1	0·1	0·2
No. of errors in maxima and minima	0	—	6	—	4	—	4	—	1	—	3	—	9	—

* Instrument under repair from 3 p.m. of the 15th to the end of the month. † Doubtful; oil frozen. ‡ Measuring cylinder.

The work for Glasgow was re-tabulated.

The following cheques for March were drawn on the 31st of that month:—

		£ s. d.	£ s. d.
Administration:			
Representatives of Professor H. J. S. Smith - -	Council fees	250 9 5	
Lieut.-Gen. R. Strachey, R.E., C.S.I. - - -	Council fees	174 7 11	
W. De La Rue - -	Council fees	141 2 11	
Sir Frederick Evans, R.N., K.C.B.	Council fees	103 8 8	
F. Galton - - -	Council fees	152 1 6	
G. G. Stokes - - -	Council fees	141 3 0	
E. J. Stone - - -	Council fees	7 14 7	
			*970 8 0
R. H. Scott, salary - - - -		- -	66 13 4
J. S. Harding, jun., salary - - -		27 15 6	
T. D. Bell ,, - - -		14 8 10	
R. G. Canham ,, - - -		8 6 8	
			50 11 0
Gas Light and Coke Co., gas - - -		5 13 11	
G. A. Gillett, wood, oil, &c. - -		2 14 8	
C. W. Jacques, rent - - - -		158 15 0	
			167 3 7
General Life and Fire Assurance Co., insurance		1 6 0	
,, ,, ,,		1 2 0	
			2 8 0
Williams & Norgate, books - - -		- -	4 13 9
H. Bond and Son, office fittings, &c. - -		57 7 4	
Maple & Co., furniture - - -		13 8 3	
			70 15 7
J. S. Harding, sen., pension, Minutes, 1882, p. 43		- -	10 14 1
Special Researches:			
Cambridge Scientific Instrument Co., fittings to photonephometers, Minutes, 28th March -		8 15 0	
,, ,, ,, ,,		17 2 0	
			25 17 0
Negretti and Zambra, sun bowls - -		3 17 0	
Scottish Meteorological Society, Ben Nevis observations, Minutes, 14th March - -		100 0 0	
C. E. Strachan, Arctic work, Minutes, 1882, p. 31		2 15 0	
R. Strachan, ,, ,, p. 104		31 10 0	
W. Thomas, care of Scilly anemometer, Minutes, 1879, p. 65 - - - - -		1 13 6	
H. Williams, care of "Bridled" anemometer, Minutes, 1879, p. 68 - - -		2 11 3	
			142 6 9
Land Meteorology:			
C. Niven, Aberdeen - - - -		67 9 4	
J. L. E. Dreyer, Armagh - - -		68 4 6	
W. L. Fox, Falmouth - - - -		72 8 6	
R. Grant, Glasgow - - - -		69 14 6	
H. Williams, Holyhead - - -		2 13 4	
			280 10 2
Kew Committee, allowance - - -		100 0 0	
,, fittings to S.R. instruments -		4 13 5	
,, postages, &c. - -		2 3 10	
			106 17 3
Carried forward -		-	- £1,898 18 6

	£ s. d.
* Deductions for income tax - - - -	27 1 8
Expenses (per J. S. Harding, jun.), Cash Book, p. 129 -	2 10 4
Payment this day as above - - - -	970 8 0
	£1,000 0 0

Office

	£	s.	d.	£	s.	d.
Brought forward -	-		-	1898	18	6
Land Meteorology—*cont.*						
C. Clouston, Orkney - - - -	2	10	0			
G. H. Aird, Seaham - - - -	2	13	9			
S. J. Perry, Stonyhurst - - -	56	1	9			
				61	5	6
J. E. Cullum, Valencia - - -	60	13	3			
,, salary - - - -	16	13	4			
				77	6	7
G. T. Watson, Yarmouth - - -	4	2	0			
R. and J. Beck, zinc plates - - -	7	14	0			
C. H. Thompson, calculating rainfall observations, Minutes, 28th March - -	4	2	0			
				15	18	0
R. H. Curtis -	22	4	5			
J. A. Curtis -	15	11	1			
T. E. Allen -	15	11	1			
C. H. Thompson -	*12	2	6			
E. G. Aldridge -	*9	15	10			
Discussion, &c. of Observations.				75	4	11
Weather Information and Forecasts:						
J. W. Mayes, Ardrossan - - -	1	0	0			
Postmaster, Bundoran - - - -	1	8	0			
H. Todd, Cambridge - - - -	4	11	0			
H. Mohn, Christiania - - - -	5	10	0			
Postmaster, Cliffony - - - -	1	1	0			
T. MacGowan, Donaghadee - - -	0	14	0			
J. Costello, Dover - - - -	3	18	6			
W. Brand, Dunrossness - - -	3	18	6			
Postmaster, ,, - - -	1	6	0			
W. Foster, Hawes Junction - - -	3	18	3			
J. Tilston, Holyhead - - - -	3	18	0			
G. G. Appleton, Hurst Castle - - -	3	18	6			
Postmaster, Inverness - - - -	1	6	0			
J. Fisher, Jersey - - - -	3	9	0			
Postmaster, Killarney - - - -	1	1	0			
,, Leith - - - -	0	13	0			
,, Lerwick - - - -	1	6	0			
F. Gaster, London - - - -	3	18	0			
W. Berridge, Loughborough - - -	3	5	8			
K. Kerr, Mullaghmore - - - -	9	15	5			
M. Mackintosh, Nairn - - - -	0	13	0			
W. D. Penny ,, - - - -	4	4	6			
W. Wickham, Oxford - - - -	3	12	6			
E. Kennedy, Parsonstown - - -	0	14	0			
G. Phillips ,, - - -	3	7	6			
J. John, Prawle Point - - - -	3	5	0			
W. Kennedy, Roche's Point - - -	0	14	0			
G. Baker, St. Ann's Head - - -	4	1	6			
R. W. Scaddan, Scilly - - - -	0	14	0			
W. Thomas, ,, - - - -	4	12	4			
J. B. Smith, Spurn - - - -	3	5	10			
D. Macdonald, Stornoway - - -	5	11	2			
Postmaster ,, - - -	1	6	0			
,, Valencia - - - -	0	14	0			
,, Wick - - - -	1	6	0			
J. Sinclair ,, - - - -	3	5	0			
G. T. Watson, Yarmouth - - -	4	12	0			
A. Guy, York - - - - -	3	18	0			
				109	12	2
Carried forward -	-			£2,238	5	8

* Five weeks ending 31st March.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	2,238	5	8
Weather Information and Forecasts—*cont.*						
P. Adie, station barometers - - -	13	10	0			
F. Dangerfield, delivery of D.W. charts - -	10	19	0			
B. Edgington, signal cones - - -	3	17	0			
W. C. Ley, postcards for cirrus observations -	2	18	10			
Postmaster-General, telegrams - - -	236	4	7			
				267	9	5
F. Gaster - }						
F. J. Brodie - }						
G. G. Francis } Preparation, &c. of Weather Reports.						
A. J. Rigby - }						
R. Sargeant - }						
F. Gaster	31	5	8			
F. J. Brodie	20	1	6			
G. G. Francis	20	7	2			
A. J. Rigby	15	0	0			
R. Sargeant	*14	18	3			
				101	12	7
Inspections:						
A. Buchan, salary - - - -	-		-	37	10	0
W. C. Ley, „ - - - -	37	10	0			
„ travelling expenses - - -	14	14	7			
				52	4	7
Ocean Meteorology:						
Capt. H. Toynbee - }						
Nav. Lieut. C.W.Baillie, R.N. } Discussion, &c. of observations and care of instruments.						
R. Strachan - - }						
C. Harding - - }						
H. Harries - - }						
Capt. H. Toynbee	33	6	8			
Nav. Lieut. C.W.Baillie, R.N.	20	16	8			
R. Strachan	27	15	6			
C. Harding	22	4	5			
H. Harries	14	12	6			
				118	15	9
P. Adie, repairing "A." barometers - -	4	7	0			
„ „ "B.T." „ - -	21	6	0			
				25	13	0
Nautical Magazine, advertisements - -	-		-	2	5	0
Negretti and Zambra, repairing "A." instruments	2	11	6			
„ „ "B.T." instruments and repairs - -	14	8	6			
				17	0	0
J. R. Jones, Aberdeen - - - -	6	15	2			
H. J. Thatcher, Cardiff - - - -	5	9	0			
P. A. Feathers, Dundee - - - -	3	15	0			
D. McGregor & Co., Glasgow - - -	15	4	6			
L. Scaping, Hull - - - -	2	7	6			
J. Gill, Liverpool - - - -	9	6	7			
G. H. Permain, Southampton - - -	2	17	4			
				45	15	1
W. Allingham, collection of synchronous observations, Minutes, 1882, p. 43 - - - - -				13	8	5
Miscellaneous:						
P. Adie, commissions - - -	43	17	6			
Chance Brothers, „ - - -	11	5	0			
Kew Committee, „ - - -	10	0	0			
R. W. Munro, „ - - -	240	3	0			
Negretti and Zambra, „ - - -	57	7	0			
F. Tallack and Son, „ - - -	1	6	4			
				363	18	10
J. S. Harding, jun., petty cash - - -	-		-	50	0	0
Total -				£3,333	18	4

* Five weeks ending 31st March.

The following cheques were drawn on the dates specified:—

		£	s.	d.
3rd March	For weekly salaries - - - -	32	2	1
10th „		34	12	1
17th „		34	8	1
24th „		33	14	1
31st „		35	14	1
7th April		35	14	1
„ „	F. Hatchett, "Compo-lithographs" - -	2	4	0
„ „	Steel and Jones, newspapers - - -	1	6	0
„ „	Pall Mall Coal Co., coals - - -	6	0	0
„ „	Postmaster-General, rent of wire at Mullaghmore - - - -	31	5	0
14th „	For weekly salaries - - - -	35	14	1
„ „	W. Wightman & Co., bookpost wrappers, &c.	8	14	0
„ „	Johnson, Matthey, & Co., chemicals - -	2	12	6
„ „	R. W. Munro, spare cylinders for observatories	54	19	0
„ „	Kew Committee, verifications - -	31	10	0
„ „	T. Rossiter, observations at Norfolk Island -	7	10	0
		£387	19	1

116, *Victoria Street, April* 25, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 14) were read and confirmed.

The first draft of the Report for 1882-3 was submitted and considered.

Reported—That the Kew Committee saw no objection to the recommendation of Mr. Figg for the post of Assistant to the Hong Kong Observatory (Letter 948). Mr.Scott reported that he had accordingly written to the Colonial Office as directed. (Minutes, p. 1) (Letter 905).

Reported—That the photographic cloud camera had been received at Kew from Captain Abney. (Miuutes, p. 3.)

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, three of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. J. Buchan -	Barque "Coppename."	Nov. 2, 1882—April 10, 1883.	Glasgow, Surinam, and London.	1882, p. 41.
Capt. W. R. Cato; Log kept by R. Ladd, Esq., F.M.S.	S.S. "Scotia" -	Jan. 1—April 19, 1883.	London, China, and home, laying cables.	1879, p. 148. 1880, p. 109.
Capt. C. H. Renaut	"Pleione" -	June 12, 1882—April 3, 1883.	London, New Zealand, and home.	1882, p. 3.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

An estimate (Letter 900) for 9*l.* 5*s.* 6*d.* for bookshelves for the Land Observatory Room was accepted.

Mr. Galton was requested to act as auditor of the accounts with the Chairman.

Submitted—The following statement of accounts for the year ending 31st March 1883 :—

Income.	£ s. d.	£ s. d.
Balance from year 1881–2		1,102 11 8
Vote for 1882–83		15,300 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	15 18 6	
(2.) Special researches	10 8 2	
(3.) Observatories and stations	7 0 6	
		33 7 2
Supply of Weather Information :		
D.W. charts and forecasts	263 16 2	
6 p.m. charts	26 6 0	
Information for Press Agencies, &c.	95 4 2	
Telegrams	210 15 9	
		596 2 1
Supply of Miscellaneous data		23 12 0
Sale of Instruments, &c. :		
Mercantile Marine account	137 4 2	
Royal Navy	23 12 6	
		160 16 8
Commission charged on work done for Colonies, &c.		22 19 4
		£17,239 8 10

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council	1,000 0 0	
Secretary	800 0 0	
Salaries and wages	746 0 9	
Rent, fuel, and lighting	669 1 5	
Furniture and fittings	252 3 9	
Incidental and contingent expenses	381 11 0	
Expenses contingent on Meteorological Congress	30 11 10	
Pensions	19 15 4	
		3,899 4 1
Special Researches		766 18 5
Land Meteorology :		
Observatories and stations	2,548 8 0	
Discussion and reduction of observations	1,406 16 5	
		3,955 4 5
Weather Information and Forecasts :		
Telegraphic reports and storm warnings	3,244 8 6	
Preparation and issue of reports and forecasts	1,410 8 6	
		4,654 17 0
Inspections :		
Salaries and travelling expenses		509 6 7
Ocean Meteorology :		
Discussion and reduction of observations	1,491 1 9	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments	200 0 0	
Royal Navy	221 6 3	
Mercantile Marine	593 14 4	
Distant island and coast stations	64 1 0	
		2,570 3 4
Balance		883 15 1
		£17,239 8 11

Liabilities.	£ s. d.	Assets.	£ s. d.
To sundry creditors	846 3 11	By cash at Bank	935 7 11
„ balance	883 15 1	„ „ at Office	102 12 0
		„ „ at Valencia	50 0 0
		„ sundry debtors	641 19 1
	£1,729 19 0		£1,729 19 0

Reported—That the following cheques have been drawn since the last meeting :—

		£ s. d.
21st April.	For weekly salaries	35 14 1
Do.	Gas Light and Coke Co., gas	6 5 6
Do.	Kegan, Paul, Trench, & Co., books	8 19 2
Do.	Postmaster-General, telegrams	196 14 5
		£247 13 2

116, *Victoria Street, May* 10, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 25) were read and confirmed.

Read—Letter 1010 from the Colonial Office, inquiring if Mr. Figg (Minutes, p. 11) required a course of training at Greenwich, and whether he could leave for Hong Kong early in June. Mr. Scott stated that he had replied (Letter 992) that Mr. Figg could not be spared from Kew Observatory until the expiration of one month from the date of appointment, but that he would not require a lengthened course of training at Greenwich.

Read—Letter 1000 from Messrs. Siemens Brothers, giving an estimate for an electrical thermometer and connected apparatus to be used in a captive balloon (Minutes, 1882, p. 75). Mr. Scott was instructed to write to Major Templer as to the weights and dimensions of such a balloon as would be required (Letter 1040).

Reported—That seven of the Atlantic charts for August 1882 had had isobars inserted. A letter (No. 972) from Captain Toynbee was read, stating that additional assistance would be required to admit of the early insertion of the isobars on the charts. Mr. Scott was authorised to engage an additional assistant.

The subject of the allowance for daily expenses to Mr. Allingham during his employment in visiting ships in London and at Liverpool was taken into consideration, and a letter from him (No. 998) was read. It was resolved that in future the allowance be 2*s.* 6*d.* per day for London and 7*s.* 6*d.* per day for Liverpool.

Read—A memorandum from Captain Toynbee reporting that since the last meeting eight logs had been received, six of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. E. C. Bennett	"Thessalus" -	May 5, 1882—April 27, 1883.	London, Sydney, San Francisco, and home.	1882, p. 15.
Capt. A. J. Brown -	S.S. "Chamois"	Jan. 31—April 29, 1883.	Cardiff, Jamaica, and home.	1882, p. 41.
Lieut.-Commanding R. F. Hoskyn, R.N., Lieut. H. Baker, R.N., Lieut. G. Pirie, R.N.	H.M.S. "Flying Fish."	Oct. 1, 1882—Feb. 1, 1883.	Surveying in Japanese and Corean waters.	1882, p. 85
Capt. E. J. Molony -	"British Merchant."	Aug. 10, 1882—April 25, 1883.	London, San Francisco, and home.	1882, p, 42.
Capt. R. Peebles -	"Tweedsdale" -	June 11, 1882—April 6, 1883.	Liverpool, Calcutta, Dundee.	1882, p. 15.
Capt. E. W. Turner	Barque "Mertola."	Feb. 28—Sept. 25, 1882.	Liverpool to River Guadiana, 3 voyages.	1881, p. 125.

Mr. Scott was instructed to present the Charts (O. 27) to Mr. Pirie, and to convey the best thanks of the Council to the other observers.

Reported—That the proof of the corrections to the Report on the Meteorology of Kerguelen (Minutes, 1882, p. 65) had been sent to Mr. Perry, as directed (Minutes 1880, p. 17). A letter from Mr. Perry (No. 1041) was read, suggesting some modifications in the wording of the Memorandum.

Mr. Galton exhibited an improved anemometer for use at the telegraph stations (Minutes, 1882, p. 109). It was resolved that this be tried at the Office.

SUBMITTED—The following STATEMENT respecting the RECORDS for January 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Action														
Records deficient, due to stoppage of clock	0	0	0	0	1 hr.	3 hrs.	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	*1 hr.	0	†1 hr.	0	0	0	0
Orientation verified	28th	—	31st	—	—	—	7th	—	3rd	—	25th	—	9th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	1	0	0	1	12	1	2	0	2	1	0
Result of 40 *Remeasurements*:—														
Greatest difference	0·0	1·0	0·0	1·0	§0·0	§1·0	0·0	1·0	0·0	1·0	0·0	1·0	1·0	1·0
Mean difference irrespective of sign	0·0	0·4	0·0	0·5	0·0	0·5	0·0	0·4	0·0	0·3	0·0	0·3	0·0	0·4
Residual difference (—Meteorological Office)	0·0	—0·1	0·0	0·0	0·0	—0·2	0·0	0·0	0·0	0·0	0·0	—0·1	0·0	+0·1

RAIN GAUGE:—							
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0
Errors in tabulation	0	1	1	5	1	6	0

BAROGRAPH :—

Action *	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Do.	Bad.	Do.	Indifferent.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0
„ „ other causes	¶5 hrs.	0	0	0	0	¶1 hr.	0
No. of errors discovered—							
In entry of standard	0	2	1	3	4	2	2
„ calculating residual correction	0	0	1	5	2	0	2
„ applying residual correction	0	3	0	4	0	2	2
„ subtraction in subsidiary tables	2	0	1	1	2	1	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	1	1	4	1
Result of 40 *Remeasurements :—*							
Greatest difference	·005	·006	·005	·005	·006	·005	·007
Mean difference irrespective of sign	·002	·002	·002	·002	·002	·002	·002
Residual difference (—Meteorological Office)	—·001	·000	+·001	·000	·000	·000	—·001
Mean monthly difference between simultaneous barograph and barometer readings	·002	·002	·001	·003	·002	·001	·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Indifferent.		Do.		Indifferent.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	10 hrs.	10 hrs.	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0	—	0	—	5 hrs.	—	5 hrs.
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	15 hrs.	—	0	—	0
„ „ other causes	0	0	0	0	0	‡4 hrs.	‖3 hrs.	‖2 hrs.	0	0	0	**4 hrs.	0	0
No. of errors discovered in entry of standard	0	0	2	2	2	0	1	1	1	1	0	0	1	2
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	1	0	0	0	0
„ „ of subtraction in do. tables	0	0	0	0	0	0	3	4	2	4	0	1	1	0
„ „ detected under glass scale	0	0	5	0	0	0	0	0	1	0	0	0	12	1
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·3	0·2	0·2	0·2	0·3	0·3	0·2	0·2	0·3	0·3	0·4	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	—0·1	+0·1	0·0	0·0	0·0	0·0	+0·1	—0·1	—0·1	—0·1	+0·1	0·0	+0·1	+0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·1	0·1	0·1	0·3	0·1	0·1	0·1	0·2	0·1	0·2	0·1
No. of errors in maxima and minima	0	—	2	—	1	—	1	—	0	—	3	—	6	—

* Orientation tested. † Measuring pencils. ‡ Photographic imperfections. § Result of 30 remeasurements only. ‖ Water added just before the hour.
¶ Changing curves too near the hour. ** Chimney smoked.

The work from GLASGOW was retabulated before examination.

Read—An application from Mr. Strachan (Letter 1073), for a grant for assistance in completing the investigation into the Meteorology of the Arctic Regions (Minutes, 1882, p. 31).

Resolved—That the sum of 30*l.* be placed at his disposal, this being the final grant; the work to be completed with Part V. (for Point Barrow, &c.)

Reported—That Mr. Baillie had recommended Mr. Wallace for a further rise of salary of 5*s.* per week, as fully qualified to act as his assistant (Letter 987).—Approved, the rise to be final.

Submitted the following :—

RETURN of the RESULT of the COMPARISON between the WARNINGS ISSUED and the WEATHER EXPERIENCED in 1882.

Coasts.	Total No. of Orders to Hoist and Repetitions.	Warnings justified by subsequent Gales, Force 8 and upwards.	Warnings justified by subsequent strong Winds, Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late, Force 9, reached at two Stations before issue.	Warnings partially late, Force 9, reached at one Station before issue.	Warnings in Error, owing to Telegraphic Mistakes	Storms for which no Warning was issued.
Ireland, south -	64	33	21	9	—	1	—	May 27.
„ east -	59	36	12	11	—	—	—	Mar. 21.
Scotland, east -	49	31	8	6	1	2	1	Jan. 10, Mar. 16, Mar. 21, Mar. 27, June 12, Nov. 4.
„ west -	42	25	4	11	—	1	1	Mar. 21, Nov. 15.
England, north-west -	58	42	5	10	—	1	—	Mar. 21.
„ west -	66	32	22	11	—	1	—	Mar. 21, Aug. 15.
„ south -	78	61	8	8	1	—	—	Mar. 21, Apr. 13,* Apr. 28, Nov. 26.*
„ south-east -	38	25	10	3	—	—	—	
„ east -	49	24	16	6	—	2	1	Mar. 21.
Totals - -	503	309	106	75	2	8	3	
Percentages -	—	61·4	21·1	14·9	0·4	1·6	0·6	

* Storms on the South coast marked thus were only felt in the Eastern part of the Channel.

Submitted the following statements of work for April 1883 :—

MARINE ROOM.

Examined 17 new logs and 3 lighthouse registers.

North Atlantic Weather Charts.

Preparation and charting of sea and land observations.
Correspondence in connexion with the despatch of forms and receipt of observations.
Commenceddrawing isobars for August.
One person's time devoted to visiting ships arriving in London and Liverpool and collecting their observations.

(Signed) CHAS. HARDING.
May 9, 1883.
H. T.

The Marine Superintendent.

PANTAGRAPH ROOM.

Copper Plates pantagraphed :—1 plate, No. 36, 1878.
Zinc Plates :—Barograms, 6 plates, Nos. 42 to 47, 1878; Thermograms, 7 plates, Nos. 42 to 48, 1878; Vapour tension, 2 plates, Nos. 38 to 39, 1878; Anemograms, 7 plates, Nos. 53 to 59, 1878; Rain curves, 18 plates, Nos. 37 to 54, 1878.
Photographic Curves.—Barograms are prepared for pantagraphing up to Plate 53, 1878.
Harmonic Analyser.—The analysis of the barograms for 1876 has been proceeded with, and the constants for Valencia, Armagh, and Glasgow obtained. Some curves of temperature constants for 1876 have been plotted for Professor Stokes.
The proofs of the 73 plates for 1877 have been checked and forwarded for press; and some time has been spent in tabulating the weekly totals of sunshine at 31 stations for the year 1881.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

Office

EXAMINATION ROOM.

SIR,

THE following curves and tabulations have been examined:—January 1882: *Thermograms*, one station; *Barograms*, three stations.

February 1882: *Thermograms*, two stations; *Anemograms*, one station.

The *notes of errors* and *monthly report* thereon for January 1882 have been written out; and the work required for the Registrar General's (of Ireland) Quarterly Report, January to March 1883, has been supplied to the Land Observatories Department.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Council.

(Signed) T. E. ALLEN.
May 1, 1883.

TELEGRAPHIC (Forecast and Storm Warnings) BRANCH (in addition to the daily routine work).

Rainfall Map of the British Islands.—Revised, title added; ready to go to press.

Charts of Mean Pressure and of Mean Temperature (referred to in previous reports).—All revised, and titles inserted. Sent to lithographer for alteration as necessary.

Mean Pressure Values (for 8 a.m.) at stations in the Daily Weather Report—Completed.

MeanTemperature Values (for 8 a.m.) at same stations.—Completed.

Calculating Weekly Rainfall for Stations in the Weekly Weather Report.—Completed.

Drawing Curves of Mean Temperature and Rainfall for Stations in Weekly Weather Report (to be used in obtaining the mean values for any week in the year).—Commenced.

Checking Storm Warnings, 1882.—Nearly completed.

FREDC. GASTER.

Reported—That the following cheques have been drawn since the last meeting:—

			£	s.	d.	£	s.	d.
28th April.		For weekly salaries				36	17	5
„	„	Eyre & Spottiswoode, special printing				3	3	0
„	„	T. De La Rue & Co., sunshine cards				18	11	10
„	„	J. H. Woodstock, packing cases				3	7	0
„	„	J. J. Hicks, thermometer screens	12	14	2			
„	„	„ commissions account	7	10	0			
						20	4	2
„	„	Capt. W. H. Stuart, observations at Bahamas (Minutes, 14th April)				10	10	0
30th	„	R. H. Scott — Salary				66	13	4
„	„	J. S. Harding, jun. — Salary				27	15	6
„	„	T. D. Bell — Salary				14	8	10
„	„	R. G. Canham — Salary				8	6	8
„	„	R. H. Curtis — Discussion, &c. of Observations				22	4	5
„	„	J. A. Curtis — Discussion, &c. of Observations				15	11	1
„	„	T. E. Allen — Discussion, &c. of Observations				15	11	1
„	„	C. H. Thompson — Discussion, &c. of Observations				9	14	0
„	„	E. G. Aldridge — Discussion, &c. of Observations				7	16	8
„	„	F. Gaster — Preparation, &c. of Weather Reports				30	8	4
„	„	F. J. Brodie — Preparation, &c. of Weather Reports				20	10	0
„	„	G. G. Francis — Preparation, &c. of Weather Reports				19	15	10
„	„	A. J. Rigby — Preparation, &c. of Weather Reports				15	0	0
„	„	R. Sargeant — Preparation, &c. of Weather Reports				12	14	0
„	„	Captain H. Toynbee — Discussion, &c. of observations, and care of instruments.				33	6	8
„	„	Nav. Lieut. C. W. Baillie, R.N. — Discussion, &c. of observations, and care of instruments.				20	16	8
„	„	R. Strachan — Discussion, &c. of observations, and care of instruments.				27	15	6
„	„	C. Harding — Discussion, &c. of observations, and care of instruments.				22	4	5
„	„	H. Harries — Discussion, &c. of observations, and care of instruments.				11	14	0
„	„	J. E. Cullum, Valencia, salary				16	13	4
„	„	J. Jackson, copying ink				1	18	0
„	„	A. H. Bell, extra computations (Minutes, 14th March)				3	12	0
„	„	J. A. Curtis „ „				5	8	0
„	„	Meteorological Society, Observations at Stations (Minutes, 1879, p. 52)				25	0	0
„	„	Kew Committee, waxed paper for Aberdeen	10	0	0			
„	„	„ verifications	1	4	0			
						11	4	0
		Carried forward				£558	15	9

		£	s.	d.
	Brought forward - - -	558	15	9
30th April.	W. Allingham, collection of synchronous observations (Minutes, 1882, p. 43) - - - -	16	10	6
„ „	W. J. Russell, fog experiments (Minutes, 1881, p. 94) -	20	0	0
„ „	J. S. Harding, jun., translations, Report International Meteorological Committee (Minutes, 14th April) -	2	13	0
„ „	J. S. Harding, jun., petty cash - - -	50	0	0
5th May.	L. P. Casella, rain gauges (Minutes, 14th March) -	24	0	0
„ „	For weekly salaries - - - - -	35	19	1
10th „	Maple & Co., furniture - - - - -	1	15	0
„ „	Pall Mall Coal Company, coals - - - -	5	10	0
„ „	Pickford & Co., carriage of parcels - - -	0	14	9
„ „	Waterlow & Sons, sectional paper - - -	1	4	0
„ „	Johnson, Matthey, & Co., chemicals for Armagh -	2	12	6
		£719	14	7

116, *Victoria Street, May* 23, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 10) were read and confirmed.

Read—A letter (No. 1097) from Major Templer giving particulars as to balloons of 6, 9, and 12 ft. diameter respectively suitable for carrying Siemens' electric thermometer with connecting wire, &c.

Mr. Scott was instructed to request Major Templer to furnish the Council with a specification and estimate for a balloon of 9 feet diameter, with holding gear, windlass, &c. (Letter 1108).

Submitted—The following reports :—

PANTAGRAPH ROOM.

SIR, May 24, 1883.

AT your request I beg to submit the following statement as to the date by which the present work of the staff of this room will be completed :—

1. The curves will be prepared and the whole of the zinc plates for 1878 cut ready, for the Wagner's pantagraph, by the end of July.

2. The remainder of the copper plates for 1878 will be pantagraphed by the beginning of October, and they should be etched and "cut up," ready for the printer, by the middle of that month. In making this estimate I have allowed for the engraver's usual holiday in August.

The pantagraphing of the copper plates is done by a boy under the supervision of either myself or Mr. Thompson, but with this exception the staff will be free from other work by the end of July and some of them possibly before that date.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) R. H. CURTIS.

EXAMINATION ROOM.

SIR, May 23, 1883.

IN answer to your inquiry as to the probable time required to complete the examination of the returns, &c. from the seven first-class observatories to the end of December 1883, I estimate that the staff of this room will be engaged on the work until the end of December 1884, provided that it be not interfered with by other requirements.

I am, &c.

R. H. Scott, Esq., (Signed) T. E. ALLEN.
Secretary Meteorological Council.

Resolved—That this subject be taken into consideration at next meeting, and that Mr. Wall, the engraver, be informed that his services will not be required after October 31.

Mr. Scott submitted a paper which he had prepared, conjointly with Mr. Lovell Squire, on the diurnal period of rainfall quantity and frequency at the seven observatories for the period from April 1, 1871, to December 31, 1880.

Resolved—That this be published as an Appendix to the Quarterly Weather Report.

The Secretary reported that he had found himself obliged to exceed the grant of 20*l.* for the expenses at the Fishery Exhibition (Minutes, 1882, p. 86) as the charts of sea temperature had cost 16*l.* 0*s.* 3*d.* He was authorised to expend a further sum not exceeding 10*l.*

The Secretary was instructed to inquire if the Scottish Meteorological Society would be able to furnish daily returns in the form adopted by the Council in their "Meteorological Observations at Stations of the Second Order" from a selection of their stations, say four or five, in order to make the tables in that volume more complete, stating that the Council would be prepared to reimburse the Society for any outlay needed for the object in view (Letter 1107).

Read—A letter from Mr. Baillie reporting that since last meeting two Logs had been received, one of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. J. L. Wharton. Log kept by Sub-Lieut. W. Richardson.	H.M.S. "Sylvia"	Sept. 7, 1882.—Jan. 8, 1883.	Surveying on coast of Patagonia.	1882, p. 63.

Mr. Scott was instructed to present the Charts (O. 27) to Mr. Richardson and to convey the best thanks of the Council to Captain Wharton.

Reported—That the following cheques had been drawn since the last meeting:—

			£	*s.*	*d.*
12 May.		For weekly salaries	35	19	1
„	„	S. W. Ship, care of Bermuda anemometer (Minutes 1878, p. 79)	4	10	0
18	„	G. A. Gillett, wood, &c.	1	2	9
„	„	Pickford & Co., carriage of parcels	1	6	2
„	„	T. Slater, acting reporter at Holyhead	1	16	0
„	„	Break & Shepherd, binding charts for Fishery Exhibition (Minutes, 17th January)	2	10	3
„	„	Chance Bros., glass sphere, (commissions account)	3	15	0
19	„	For weekly salaries	35	19	1
23	„	Hopkin & Williams, chemicals for Aberdeen and Valencia	2	13	11
„	„	Johnson, Matthey, & Co., chemicals for Valencia	2	12	6
„	„	Meteorological Society, observations (Minutes 1879, p. 52)	19	3	4
„	„	Postmaster General, telegrams	226	12	9
„	„	J. Lawrence, model of signal apparatus for Exhibition (Minutes, 17th January)	2	10	0
			£340	10	10

SUBMITTED—The following STATEMENT respecting the RECORDS for February 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonynurst.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orientation verified	28th	—	28th	—	3rd	—	4th	—	—	—	14th	—	6th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, irregular differences	0	0	0	0	1	2	1	3	0	0	0	2	1	0
Result of 40 *Remeasurements*:—														
Greatest difference	0·0	1·0	0·0	2·0	0·0	1·0	0·0	1·0	0·0	1·0	0·0	0·1	1·0	1·0
Mean difference irrespective of sign	0·0	0·3	0·0	0·4	0·0	0·3	0·0	0·3	0·0	0·2	0·0	0·3	0·0	0·7
Residual difference (— Meteorological Office)	0·0	0·0	0·0	0·0	0·0	0·0	0·0	−0·2	0·0	0·0	0·0	−0·2	0·0	+0·1
RAIN GAUGE:—														
Action	Good		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		4 hrs.	
,, ,, other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		0		0		6		0		0		0	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Bad.	Indifferent.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	8 hrs.	0	0
„ „ failure of light	0	0	0	0	0	1 hr.	0
„ „ other causes	0	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	1	1	2	6	1	0
„ calculating residual correction	1	1	1	0	0	0	0
„ applying residual correction	2	1	0	5	3	1	1
„ subtraction in subsidiary tables	0	0	4	2	5	0	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	10	0	0	2
Result of 40 *Remeasurements :—*							
Greatest difference	·007	·006	·005	·007	·006	·005	·010
Mean difference irrespective of sign	·003	·002	·003	·003	·002	·002	·003
Residual difference (— Meteorological Office)	—·001	—·001	·000	+·001	+·001	·000	—·002
Mean monthly difference between simultaneous barograph and barometer readings	·001	·002	·001	·002	·002	·001	·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Bad.		Indifferent.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	7 hrs.	—	0	—	0	—	1 hr.
„ „ partially frozen bulbs	—	6 hrs.	—	0	—	0	—	2 hrs.	—	10 hrs.	—	1 hr.	—	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	0	0	0	0	0	0	1	1	0	2	1	0
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	1	0	0	0	1	4	3	1	0	2	0	0
„ „ detected under glass scale	0	0	1	0	0	0	1	1	1	1	0	0	14	0
Result of 40 *Remeasurements :—*														
Greatest difference	0·3	0·2	0·3	0·2	0·2	0·2	0·2	0·3	0·2	0·2	0·3	0·3	0·4	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0·1
Residual difference (— Meteorological Office)	—0·1	0·0	0·0	+0·1	0·0	0·0	0·0	—0·1	—0·1	—0·1	0·0	0·0	+0·2	+0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·1	0·1	0·1	0·2	0·2	0·1	0·1	0·1	0·1	0·1	0·2
No. of errors in maxima and minima	0	—	2	—	1	—	2	—	1	—	5	—	8	—

NOTE :—The GLASGOW work was re-tabulated at Observatory before examination.

116, *Victoria Street, June* 6, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 23) were read and confirmed.

The subject of the future work of the Office, after the proposed reduction in number of the self-recording observatories had been carried out, and the instrumental curves had been engraved up to the end of 1880 was brought under notice.

The Chairman and Mr. Galton were requested to consider the subject and submit a report on it.

The Chairman submitted the following letters relating to suggested modifications of the Weekly Weather Report (Minutes, 1882, pp. 1, 31, and 56):—

SIR, Rothamsted, St. Albans, March 1, 1882.

IN your circular letter of December 6, 1881, you ask, on behalf of the Meteorological Council, what meteorological statistics are the most important to agriculturists, and in what form it is desirable that these statistics should be presented. You at the same time enclose a copy of the Weekly Weather Report, with a specimen of the Quarterly and Annual Summaries of Weather, issued by the Meteorological Office for agricultural and sanitary purposes.

We have now given the subject careful consideration, and we think the most useful form of reply will be to state the manner in which we have dealt with meteorological statistics, and the difficulties which we have encountered in endeavouring to apply them to the elucidation of problems of vegetable growth.

The factors which we have correlated and studied are the following:—

1. Monthly rainfall, inches.
2. Number of rainy days.
3. Monthly maximum temperature.
4. Monthly minimum temperature.
5. Monthly mean temperature.
6. Monthly mean range of temperature.
7. Monthly mean dew point.
8. Monthly mean degree of humidity (saturation = 100).

The reports issued by the Meteorological Office provide information for the first six of these items, for each week, each civil quarter, and each civil year; but they do not afford the means of tabulation for calendar months, for comparison with records of earlier date. Nor do the reports give any information on the dew point, and "degree of humidity" of the air. The records of hours of bright sunshine recently given are, however, a valuable addition, and it is to be regretted that they have not been longer available.

It is true that the weekly registers give more detailed information as to the characters of the seasons than would monthly summaries, and they are, therefore, very desirable, but the results cannot be conveniently arranged with others prior to the date of the commencement of these weekly records, and we have found it a great desideratum to tabulate results for at least the series of years (39) during which our own more exact field experiments have been in progress, and even for much longer than this.

It is, too, important to have the means of arranging meteorological statistics comparatively for any period of the year, according to the particular crop under study. On this point we may remark that we have found the really most luxuriant and heavy crops, both of hay and of wheat, to have been very materially influenced by the characters of the winter and early spring periods,—*quantity* in both cases depending very greatly on the early development of the plant. With favourable conditions in this respect some of our very heaviest crops, both of hay and wheat, have been obtained under by no means specially favourable meteorological conditions during the period of most active above-ground growth. On the other hand, high proportion of corn to straw, which sometimes gives really high yield per acre, depends more upon the conditions of the periods of active above ground growth and maturation. In the same way, great weight of hay sometimes depends upon the conditions of maturation rather than of luxuriance.

It is obvious, therefore, that in discussing the relations of meteorological condition and agricultural production, it is essential to be able to arrange the records for any selected periods of the year,

and as most earlier records, whether given in more detail or not, are summarised for calendar months, it is desirable to be able to arrange any new data in the same way, for comparison, and for the study of lengthened periods.

Then, again, it seems to us very desirable to have records of dew point, and degree of humidity of the atmosphere. When comparing the productive characters of long series of seasons, we have tabulated these items as far as available; and as with the other elements, we have tabulated not only the *actual* results, but also their indices, that is, we have arranged the highest or the lowest (as the case may be), as 1, and so on. And here we would call attention to the total inadequacy of the record of "relative humidity," or "degree of humidity," saturation = 100 (the latter much the better term), to convey any clear idea of the actual and relative condition of the atmosphere in regard to moisture, even comparing the same period of different years, and still less, comparing different periods. We have, indeed, found it necessary to tabulate and study together mean temperature, dew point, and degree of humidity.

The table appended hereto forcibly brings to view the utter uselessness of "relative humidity" alone, and so far we feel that there is much to be said in favour of Mr. Greaves's objections to the usual mode of record. The table shows, for January and for July, for 20 years, 1852 to 1871 inclusive, the years arranged in the order of the highest mean temperature; and by the side of this column are given the mean dew point, and the "degree of humidity," and for each of the two latter items the indices are given.

It will be seen that for each month, as would of course be expected, the dew point (though on another level) runs fairly parallel with the mean temperature; but that the "degree of humidity" has no relation to either. Then, again, with a mean dew point about 20 degrees lower in January than in July, the mean "degree of humidity" is 87 for January, and only 75 for July with its much greater actual amount of moisture. The figures at the foot of the table, which show for January and July respectively, the years of highest and of lowest mean temperature within the twenty years, and the other items side by side, strikingly illustrate the point.

Were it not that the record of "degree of humidity" or "relative humidity" is so generally adopted, would it not be even better to record the *degree of dryness*—that is, the complementary amount to the degree of humidity, instead of 87 degree of humidity, 13 degree of dryness, instead of 75 degree of humidity, 25 degree of dryness, and so on?

But it seems to us that some mode of record which will clearly convey an idea, of both the actual and the relative degree of humidity, and of dryness, of the atmosphere, is very much wanted; and that this must recognise the element of temperature. In studying the matter, we have placed, side by side, the mean temperature, and the mean dew point; and if these, and the difference between them, were given, the latter would in a sense show the dryness in degrees; and this would be much lower with the lower temperature and the lower dew point of January than with the higher temperature and the higher dew point of July. The record of the dew point would thus convey some idea of the actual and relative moisture, and that of the difference, of the actual and relative dryness of the atmosphere; and the figures would not run inversely, as they do under the system of representing "relative humidity." Of the exact mode of getting over an obvious difficulty you will, however, be much better able to judge than we can be.

Independently of tabulated record, we consider that "remarks," as given in the weekly returns, are of the highest value; for it is obvious that even weekly, and still more, monthly, means, are inadequate to bring to view meteorological conditions, or changes, which may very materially affect vegetation, favourably or unfavourably, as the case may be. In connexion with this point we have said:—

"It is obvious that different seasons will differ almost infinitely at each succeeding period of their "advance, and that, with each variation, the character of development of the plant will also vary, "tending to luxuriance, or to maturation, that is, to quantity or to quality, as the case may be. "Hence, only a very detailed consideration of climatic statistics, taken together with careful periodic "observations in the field, can afford a really clear perception of the connexion between the ever-"fluctuating characters of season and the equally fluctuating characters of growth and produce. It "is, in fact, the distribution of the various elements making up the season, their mutual adaptations, "and their adaptation to the stage of growth of the plant, which throughout influence the tendency "to produce quantity or quality. It not unfrequently happens, too, that some passing conditions, "not indicated by a summary of the meteorological register, may affect the crop very strikingly, "and thus the cause will be overlooked, unless careful observations be also made, and the stage of "progress, and tendencies of growth, of the crop itself at the time, be likewise taken into account." Again, "those characters of season which are very unfavourable for land in poor condition, may be "favourable to land in high condition, and *vice versâ*."

There is another point in connexion with the utilization of meteorological records in the study of vegetable production, which is worthy of consideration, with the view of determining how far such records can be so arranged as to aid its study, and how far the results are of value; namely, the question of the aggregate temperature required for the growth and maturation of different crops.

De Candolle, Boussingault, Hervé-Mangon, and others, have attempted such estimates. They have assumed all degrees above a certain temperature to be effective for growth; generally, we believe, all above 6° C = about 43° F. (42·8). We have ourselves attempted to make estimates of the kind for wheat, for the series of years over which our exact field experiments with the crop have extended. Having, however, at command, only the records of *monthly* mean temperature for the series of years in question, we have taken, alternatively, the 1st of March and the 1st of April

as the commencement of the period of active growth, and in both estimates the date of the cutting of the crop as the termination. Deducting 43 from the mean monthly temperature, and multiplying the difference by the number of days of each month, and adding the results together for the whole period, we have got a figure which is supposed to represent the aggregate number of degrees of effective temperature. It was found, however, that monthly means were very inadequate for such a purpose; and we have done something towards collecting records of *daily* mean temperature for the whole period of the experiments, with a view to making more accurate estimates. We submit whether it would not be practicable to adopt a mode of record which would show the aggregate number of degrees of temperature above some well-considered base line, from time to time as the season advances, so that the value of the record might be tested for various agricultural crops, and other plants? Perhaps, also, with this might be given the number of hours of sunshine for the same periods? At present, temperature and duration of sunshine seem our only means of judging of the efficiency of the sun's rays for the purposes of vegetation; but it is to be supposed that the element of quality as well as quantity is of importance to consider, more especially as between different periods of the year.

Obviously, the questions of the temperature of the soil, and of evaporation and percolation, are also important, but it is difficult to see how the Meteorological Office could obtain and supply appropriate data on these points.

We are, &c.
(Signed) J. B. LAWES.
J. H. GILBERT.

MEAN TEMPERATURE, DEW POINT, and DEGREE OF HUMIDITY for JANUARY and JULY, 20 YEARS, 1852—1871.

JANUARY.						JULY.					
Years.	Mean Temperature in Order of Highest.	Mean Dew Point.	Mean Degree of Humidity. Saturation = 100.	Highest = 1. Dew Point.	Highest = 1. Degree of Humidity.	Years.	Mean Temperature in Order of Highest.	Mean Dew Point.	Mean Degree of Humidity. Saturation = 100.	Highest = 1. Dew Point.	Highest = 1. Degree of Humidity.
1866 -	42·6	38·4	86	1	10	1859 -	68·1	58·3	70	1	17
1853 -	42·4	36·2	81	6	18	1868 -	67·5	54·6	63	7	20
1852 -	42·0	—	—	—	—	1852 -	66·6	57·2	73	2	12
1863 -	41·8	37·6	85	2	12	1870 -	65·4	55·0	70	5	17
1869 -	41·1	37·6	88	2	6	1869 -	64·5	56·2	75	3	11
1859 -	40·4	37·0	88	4	6	1857 -	64·5	54·8	71	6	16
1860 -	39·7	36·2	88	6	6	1865 -	63·8	54·2	72	9	13
1856 -	39·4	36·4	91	5	3	1855 -	62·1	55·5	80	4	2
1854 -	39·0	36·1	92	8	1	1864 -	61·8	51·6	70	19	17
1862 -	39·0	34·6	85	9	12	1871 -	61·7	53·9	76	10	9
1870 -	38·3	34·1	85	11	12	1856 -	61·1	54·5	79	8	3
1858 -	37·5	—	—	—	—	1866 -	61·0	53·7	78	11	4
1868 -	37·2	33·4	86	12	10	1861 -	60·9	53·7	78	11	4
1857 -	36·6	34·6	92	9	1	1863 -	60·8	51·7	72	17	13
1864 -	36·5	31·3	82	15	17	1858 -	60·6	51·5	72	20	13
1865 -	36·3	33·0	89	13	5	1853 -	60·3	52·2	77	16	8
1855 -	34·9	31·7	91	14	3	1854 -	60·3	53·6	78	13	4
1867 -	34·2	29·7	83	17	16	1867 -	59·4	51·7	76	17	9
1861 -	33·9	30·1	85	16	12	1862 -	59·1	52·4	78	14	4
1871 -	33·2	29·7	87	17	9	1860 -	57·9	52·3	83	15	1
Average	38·3	34·3	87	—	—	Average	62·4	54·0	75	—	—

HIGHEST and LOWEST MEAN MONTHLY TEMPERATURE in 20 YEARS, 1852—1871.

1866 -	42·6	38·4	86	1	10	1859 -	68·1	58·3	70	1	17
1871 -	33·2	29·7	87	17	9	1860 -	57·9	52·3	83	15	1

DEAR GENERAL STRACHEY, Harpenden, St. Albans, February 13. 1883.

WE have now done all we proposed to do in the matter of the tables relating to aggregate temperatures above a base line to which I referred in mine of December 9, 1882, and we send you copies herewith. Besides these, we also send you tables relating to duration of bright sunshine, and to aggregate rainfall.

Referring first to the temperature tables, those sent you (besides your own returned), are as follows:—

Table A. I.—Copy of the table in your letter of November 13, 1882, showing the results of your calculations of aggregate temperatures for 1873: (*a*) by measurement from the Kew curves; (*b*) your own calculations; (*c*) results of the simple deduction of the base figure (42°) from the mean of maximum and minimum. The second division of the table shows the aggregates for each of the foregoing, and the third division these aggregates × 5, giving, therefore, the aggregates of the daily excess of temperature.

It may be mentioned that the date of cutting the Rothamsted experimental wheat that year (1873) was August 19; assuming for the sake of example that active above-ground growth commenced on April 1, the aggregate excess of temperature over 42° F. from that date to the date of cutting inclusive, calculated from *monthly mean max. and min.*, was 1947° F.; calculated from *daily records*, 1991; and according to your calculated result, it would be almost exactly 2000. Of course, assimilation or accumulation would have ended some time before the date of cutting, the temperature after this being effective in maturation and drying up, as distinguished from assimilation.

Table A. II.—Shows, (*a*) your results for Rothamsted, for 1881, and for 1882 (from Weekly Weather Reports), first calculated by your method, and second the mean of max. and min.; (*b*) the aggregates of the foregoing; (*c*) these aggregates × 7.

In 1881 the cutting of the experimental wheat at Rothamsted was commenced on August 8. Again, for the sake of illustration, assuming the commencement of the active growing period to be April 1, from that date to August 8 there was, according to your own calculation, an aggregate of 1623° of daily excess over 42°, and according to the approximate method (mean of max. and min.), 1664°. In 1882 the commencement of cutting was August 10, and from April 1 to that date your calculations show an aggregate of 1525°, and the approximate method shows 1573° of daily excess.

It is obvious, however, that April 1 can no more be adopted as the date of commencement of active above-ground growth (assimilation of carbon from the atmosphere), in all seasons, even for the same locality, than can the date of cutting the crop be taken as the period of the termination of growth.

Thus, whilst according to your calculation there was in 1881 an aggregate excess of daily temperature over 42° of between 60° and 70°, prior to April 1, there was an aggregate excess of nearly 200° up to the same period in 1882. And it is of interest to observe that, with these differences in the character of the two seasons as to the temperature of the first three months of the year, the weights of the first crops of hay, and of the total produce of winter-sown wheat (grain and straw together), were very different. They were very much higher than the average in 1882, with the considerable excess of temperature in the first three months of the year; and the produce of both was considerably below the average in 1881, with the low aggregate excess of temperature in the early months of that year. It is obvious that, in the case of 1882 at any rate, the date of the commencement of the growing season should be taken much earlier than April 1, the period adopted in the foregoing illustration.

It will be remembered that in our memorandum dated March 1, 1882, we called attention to the fact that the *heaviest* crops, of both hay and wheat, were generally obtained in seasons in which the winter and early spring months were favourable for the early development of the plant.

It may here be observed that, taking the average of 28 harvests, 1852—1879 inclusive, the aggregate excess of daily temperature over 42°, from April 1 to the date of cutting the experimental wheat at Rothamsted, was 1,976, calculated from monthly mean temperatures only. Again, calculations from daily records for six years, 1871–1876 inclusive, showed an aggregate excess of daily temperature over 42°, of 2010°, from April 1 to the date of cutting. Compared with these results, Boussingault's calculations for wheat in 10 localities, four in France and six in North and South America reduced to the same standard, show considerably higher aggregates. His method was to multiply the estimated number of days from the commencement of growth to harvest by the mean temperature of the period (in Centigrade degrees). On the other hand, the estimates of Hervé-Mangon for wheat in the north-west of France, if we interpret them rightly, correspond to lower figures than the above for Rothamsted. So far as we understand, he excluded from calculation all days the mean temperature of which was lower than 6° C. (42°·8 F.), taking all the rest at their value above 0° C.

Table A. III.—Shows the results of your calculations for 1881, for the first five districts for which records are given in the Weekly Weather Reports, as follows: (*a*) your results for each week; (*b*) the aggregates of (*a*); (*c*) these aggregates × 7, to bring them into aggregates of daily degrees of excess.

Table A. IV.—Shows the same items for 1882.

A glance at these two tables shows that in 1881, the season of limited growth of permanent grass and of autumn-sown wheat, there is scarcely any excess of temperature (over 42°) before the second week of March in any of the districts; indeed very little for some weeks after that. In 1882, the year of bulk of produce of these crops, there was some excess in almost every week from the commencement of the year. The comparative characters of the two seasons on this point are therefore well illustrated in these two tables; and the difference between the different districts is also shown at a glance.

Then, again, if we assume by way of illustration that an aggregate of 1,800 excess of daily degrees over 42° is required for the growth and ripening of wheat, the tables show at what different dates this point would be reached in one and the same district in the two seasons, and at what still more widely different dates it would be reached in the different districts; and if there was a column for each of the ten districts the contrasts would be more striking still.

With the different distribution of the excess of temperature, its different relation with other climatal elements, and the different mutual adaptation to stage of growth of the plant accordingly, throughout different seasons, it is not to be supposed that the same aggregate excess of daily degrees would bring the crop to maturity in different seasons. It is obviously necessary to study the records for a considerable series of seasons, having regard to the known characters of growth of those seasons, before a decisive judgment can be formed as to the exact applicability, and the real practical value, of such records.

An important question arises—how far the usual records of mean daily temperature, or those of excess over a given degree calculated therefrom, may be taken as true measures of relative temperature at different periods of the season, or of the efficiency of the sun's rays for the purposes of vegetable growth. Of course, as the season advances, not only does the actual mean temperature rise, but the higher temperature operates for a longer time per day, and the conditions of light as well as heat are different. In fact, there is a difference, not only in the amount of heat, but also in the quality of the rays in other respects, as affecting growth.

As bearing upon this point it seemed of interest to collate the records of hours of bright sunshine per week, and of mean temperature per week, and to see how far their maxima and minima, or their rise and fall, would be accordant or divergent at different periods of the season. Table 0 shows, for the ten districts for which records are given in the Weekly Weather Reports, the dates ending the weeks of first, second, and third highest mean temperature, for five years, 1878–1882 inclusive, also of the weeks of the first, second, and third highest number of hours of bright sunshine, for the three years, 1880–1882 inclusive, for which records are given.

The table shows that, in 1878, the weeks of first and second highest mean temperature were all but one in July; that one, and all the weeks of third highest mean temperature being early in August. In the wet and cold season of 1879, the first, second, and third weeks of highest mean temperature ended in all cases but one in August, and in most were entirely within that month. In 1880 they were about equally divided between August and September; but the weeks of actually the highest mean temperature were more frequently in August than September. In 1881 the records of high mean temperature per week fall, with one exception (May 30), in July and August; the more frequently in July, and those of actually the highest always in that month. In 1882, the records always fall in July or August, but the more frequently in August.

The weeks of maximum number of hours of bright sunshine, on the other hand, come very much earlier in the season than those of maximum mean temperature. In 1880 they come the most frequently in May, sometimes in June or July, and occasionally even in August and September. In 1881 they also come the most frequently in May, pretty frequently in June, less frequently in July, occasionally in April, but never later than July. In 1882 the week of actually the highest number of hours of bright sunshine is always, and that of the second highest frequently, in May; that of the third highest is once in May, several times in April, twice in June, once in July, and twice in August.

It is true that the records above referred to, even for mean temperature, are for only a few and somewhat exceptional years; and those for duration of bright sunshine are for fewer still. It is, however, quite consistent with general observation that July should be the month of highest mean temperature. As to the period of longest duration of bright sunshine, so far as the records go, they indicate it to be not only very much earlier than that of highest mean temperature, but considerably earlier than the longest day, that is, considerably earlier than the period of longest possible duration. Indeed, the period of longest actual duration of bright sunshine averages, in these three years, about two months earlier than that of highest mean temperature. It remains to be seen how far these results are borne out by more extended observations.

It may here be mentioned in passing that the period of maximum rate of assimilation over a given area, by our hay and cereal crops, especially the latter, is doubtless considerably later than that so far indicated as the one of longest duration of bright sunshine. In the case of wheat, for example, direct experiments showed that the period of maximum carbon assimilation was after June 21; and, so far as can be judged, the period of the completion of carbon assimilation by that crop corresponds, approximately, with that of the highest mean temperature.

From the foregoing it is obvious that records of duration of bright sunshine and those of mean temperature supply measurements of very different elements of sun-effect on vegetation; and the result is quite consistent with what is established as to the rays which are the most effective in carbon-assimilation.

So far as temperature is concerned, supposing the mean daily values as usually obtained are equally fair measures at different periods of the season, the important question still remains as to what base line, over which to calculate excess effective for growth, should be adopted?

As already referred to, Boussingault took into account all degrees over 0° C. On the other hand, Hervé-Mangon, and we believe others, have not reckoned temperatures over 0° C. to be effective unless ranging 6° C. = 42° · 8 F. Of course, different plants are differently affected by a given low degree of temperature; but unless tables were to be constructed for different base lines, it seems desirable to select some point that is recognised as being approximately that at which vegetation generally begins to be active above ground. To meet this requirement 6° C. (= 42° · 8 F.) seems to be of fairly general application. For the Fahrenheit scale, however, it will be more convenient, and near enough, to adopt 42°. This figure has also the advantage, as referred to by you, of being an even 10° over 32°.

The further consideration that each plant, and each plant-function, has its own best temperature, has been taken to raise doubt as to the applicability and value of records of aggregate temperatures

at all. So far, however, as general accumulation and growth are concerned, it seems probable that such records would afford valuable data for study. Variations of result are indeed to be expected, depending partly on the special range of temperature best suited to different plants, and partly on the mutual adaptation with other climatal elements, the resultant of which determines the stage of advance in the life history of the plant. It is, however, we imagine, not to be supposed that such records as are now contemplated would be available in the study of nice questions of sensitiveness, or of tendencies of growth, of delicate or choice horticultural plants. It is supposed rather that, if found to be of value, they will be so with reference to the adaptation of different districts, and of different seasons, for the growth of agricultural and horticultural plants of extended cultivation and general utility. With a view to the study of such questions, we are of opinion that records of aggregate temperatures, over a base line, will be of value, and that 42° F. is as good a base line as can be selected if only one is to be adopted.

Assuming that the aggregate excess of daily temperature over a base line, and the aggregate hours of bright sunshine, are each valuable elements for study, it becomes a question in what form they can be best recorded so as to be readily available for consideration with reference to the growth of any crop, or for any period of the year. If we had only to consider the growth of winter-sown wheat it would be desirable that the records should be made up for harvest-years; that is from September 1 of one year to August 31 of the next. But, inasmuch as even the various agricultural crops have their different seasons of growth, and garden crops have a greater variety of periods still, it will be convenient that the records should be arranged for civil years. The present mode of record for individual weeks only, with the difference from the average, is certainly of very limited utility; as no view of the progress of the season for a longer period, either in any one locality, or in different localities, can be obtained without troublesome collation from individual weekly records and independent calculation of the results. We have, therefore, considered what forms of record would conveniently show the progress of the season at one view, and afford the means of easy calculation for any desired period.

The Tables B. afford examples of such modes of record.

Table B. I. shows the form of record of aggregate excess of daily mean temperatures over 42°, *within each week*, and the difference from the mean for the week, for 1881; and Table B. II. shows the same for 1882. Such a record for the ten districts could probably be conveniently arranged for a current year in one page; the additional line of figures being added each week.

Tables B. III. and B. IV. show the aggregate results *from the commencement of the year*, for 1881, and for 1882, respectively; and a corresponding table might be arranged for a current year.

It is a question whether a table of *actual mean temperatures* for each week, arranged in corresponding form, should not precede the one of aggregate excess over 42° within each week.

Such a series of tables would show at one view the actual and relative progress of the season as to temperature, in each of the ten districts; and an easy means would be afforded of calculation for any desired period of the year. If such tables were arranged for as many years back as the data are available for, the means would be provided for testing the value of the records; and we ourselves should study the results with reference to the known facts of production of the different seasons, with much interest.

Table B. V. shows for 1881, and Table B. VI. for 1882, in like manner, the records of the number of hours of bright sunshine, and the percentage of possible duration *within each week*; and Tables B. VII. and B. VIII. show the aggregate hours *from the commencement of the year up to the end of each week*, for each of the ten districts.

Table B. IX. and Table B. X. show for 1881, and for 1882, respectively, the actual rainfall *within each week* throughout the year; and Tables B. XI. and B. XII. show the aggregate rainfall *from the commencement of the year up to the end of each week.*

If such forms of weekly summary for the ten districts were adopted for each current year, there would be two (or three) such summary tables for temperature, two for hours of bright sunshine, and two for rainfall, in all six (or seven) pages. The records would then be in a most convenient and useful form for study, and for further calculation, which cannot be said of the forms in which they are now presented.

The question of the most convenient form of quarterly or annual summary, giving a comparative view of the meteorology of the current year with that of past individual, or series of years, we have not considered. This must in a measure depend on the exact form of weekly record adopted, and would probably suggest itself on the consideration of the latter.

Referring to other points considered in our letter of March 1, 1882, it is to be observed that, supposing the above suggestions as to the record of temperature and rainfall were adopted, although the new forms would have great advantages, the desideratum of obtaining monthly records, to compare with those of the past, would still not be met.

There is also the further *desideratum* of some improved mode of representing the actual and relative condition of the atmosphere as to moisture, to which we referred.

Lastly, how far the difference in the quality of the sun's rays at different periods of the season can be made the subject of systematic observation and record, seems worthy of consideration.

I have only to add that Sir J. B. Lawes begs me to say he concurs in the foregoing remarks and suggestions.

I am, &c.
(Signed) J. H. GILBERT.

The draft of the Barometer Manual for Seamen was partially considered (Minutes, 1882, p. 112).

Read—Letter 1148 from Mr. Abercromby accompanying the MS. of a paper, entitled, "The Principles of Weather Forecasting," to replace a portion of the old Barometer Manual (Minutes, 1882, p. 112).

Mr. Galton was requested to examine the MS. and report thereon.

Submitted—Letter No. 1175 and 1196 from Major Templer giving an estimate for a balloon, as requested (Minutes, p. 88), and also Letter 1222 from M. Mascart, enclosing notes of prices of balloons in Paris.

Mr. Scott was instructed to write to M. Mascart requesting him to procure a detailed estimate.

Submitted—The following report (Minutes, p. 3) :—

NOTES on the STORM of March 6, 1883. (Letter 1343.)

The Northerly storm of the 6th March, which is reported to have caused the loss of 328 lives in the North Sea, was one which took every Meteorological Office in Northern Europe more or less by surprise, inasmuch as it was not due so much to the advance of a definite depression over the region, as to the gradual extension of an area of great reduction of pressure over the German Ocean, &c., while an anticyclonic system existed to the westward of the British Isles. These conditions allowed of the production of very steep gradients for Northerly winds between Norway and the English Coast.

On the 4th, at 8 a.m. (Fig. 1), an elongated anticyclone, with readings exceeding 30·7 ins., stretched from the Irish Sea to the south of the Baltic; the barometer in Northern Scandinavia having fallen about 0·2 in. from the previous day.

At 6 p.m. (Fig. 2), the fall had extended southwards and eastwards, and the anticyclone moved westwards, breaking up into two areas of 30·7 ins.

On the 5th, at 8 a.m. (Fig. 3), the fall of the barometer had extended to Northern Germany, and the eastern portion of the anticyclone had been obliterated, while the barometer had risen slightly in Ireland, where the centre of the anticyclonic system was found.

At 2 p.m. (Fig. 4), the fall of the barometer had become serious in Norway, but although the same reduction of pressure was noticeable along the east coast of Great Britain, while in the west the readings were scarcely changed, and although a gale had set in at Wick and in the Shetlands, there did not seem cause for alarm on our coasts generally, especially as the extra reports, which had been sent for from Donaghadee and Stornoway, did not indicate increase of wind. At noon, however, the anemometer at Sandwick showed 51 miles an hour from W. by N.

By 6 p.m., however, (Fig. 5), matters had grown worse. The wind in the Orkneys and Caithness had veered northwards, the storm continuing at Sandwick, and at Wick a gale, of force 10, was reported at 6 p.m.

None of the Scotch reports, however, had reached the Office before 7 p.m., a circumstance not unusual in disturbed weather, and accordingly it was not until nearly 7h. 50m. p.m. that the following warning was sent to the east coast of Great Britain, from Dundee to Yarmouth, as well as to the Clyde and the Irish Sea :—

"Hoist North Cone, depression off Wick moving south-eastwards ; Northerly gales likely."

The district warned is shown by the dotted lines on Fig. 6.

It was not considered to be worth while to warn the north coast of Scotland, as the gale was already blowing in Caithness.

During the night the conditions became more serious ; the barometer at Stornoway remained almost unchanged, but everywhere else, within the area of our reports, except at Corunna, it had fallen by 8 a.m. (6th) and to the extent of more than an inch at Fanö in Denmark (Fig. 6). A heavy gale from N.W. and N. was blowing in the north of Scotland, and force 8 was reported from Spurn Head, Donaghadee and Holyhead, with snow and hail squalls at the first-named station.

This chart, however, does not give an idea of the fury of the storm at sea, nor can it be gathered from the German or Scandinavian weather reports.

The only station which reports excessive violence is Seaham, where, while the observer was changing the paper on the anemograph, the sheet was blown out of his hand by a violent gust and lost. He estimates the gale as of great force, but no other station reports a storm which would have caused so great a loss of life as unfortunately occurred over the North Sea generally.

At 2 p.m. (6th) (Fig. 7), and again at 6 p.m. (Fig. 8), the gale was still prevailing and affecting the stations more generally, but no force above 9 was reported, and that only from Aberdeen and Shields.

Fig. 9 for 8 a.m. on the 7th shows the wind still strong, and the gale continued throughout the day, but gradually decreased in force, as the barometer fell generally over the British Isles, and rose on the eastern shores of the North Sea, so that gradients for northerly winds became less steep.

The following are the hourly readings of the anemograms along the east coast during the 5th, 6th, and 7th, and they show the gradual extension of the gale during the two first days :—

Direction and Force of the Wind.

Hour.	March 5th, 1883.										March 6th.										March 7th.										Hour.
	Sandwick.		Aberdeen.		Alnwick Castle.		Seaham.		Yarmouth.		Sandwick.		Aberdeen.		Alnwick Castle.		Seaham.		Yarmouth.		Sandwick.		Aberdeen.		Alnwick Castle.		Seaham.		Yarmouth.		
1 a.m.	W by N	14	SW	5·5	SSE	5	W	12	NE by E	3	NW by N	57	NW by N	36	NW by W	24	Sheet blown away. "A fierce gale from 3 a.m. from N."		NNW	15	NNW	35	NNW	20	Wind NNW.	19	N by W	27	N	32	1 a.m.
2 „	„	19	W	6·5	„	4	„	9	N	4	„	59	„	37	NNW	19			NW by N	15	„	37	„	19		19	„	21	„	30	2 „
3 „	W	24	WSW	4·5	W by S	8	„	10	N by W	6	„	59	„	34	N	21			NNW	16	„	37	NW by N	21		18	„	32	„	24	3 „
4 „	W by S	31	SW	5·5	„	9	„	12	N	4	„	58	„	38	NNW	23			„	20	„	35	NNW	19		18	„	31	N by W	22	4 „
5 „	W	36	WSW	7·5	W	11	„	11	N by W	6	„	56	NNW	35	N by W	23			„	22	„	38	NW by N	30		20	„	31	N	32	5 „
6 „	W by S	39	W	7·5	„	9	W by S	11	N by E	8	„	56	NW by N	32	NW by N	25			„	27	„	40	„	25		16	„	31	„	28	6 „
7 „	„	39	„	9·5	„	9	„	12	N	8	NNW	58	NNW	33	NNW	23			„	24	„	38	NNW	22		16	NW by N	27	„	28	7 „
8 „	WSW	42	W by S	9·5	„	8	„	12	„	4	„	56	„	35	NW by N	23			„	26	„	37	NW by N	24		18	N by W	30	N by W	28	8 „
9 „	W by S	45	WSW	12	„	12	W	14	N by W	7	„	55	NW by N	35	NNW	25			„	31	N by W	37	NNW	22		19	NNW	27	„	21	9 „
10 „	W	42	W	23	„	9	WNW	13	NNW	4	„	55	NNW	38	N by W	26			N by W	30	NNW	41	„	23		19	N by W	35	„	22	10 „
11 „	W by N	51	„	21	W by N	16	„	13	NW by N	2	„	53	„	33		25			„	28	N by W	36	N by W	23		19	„	42	„	22	11 „
Noon	„	51	„	23	WNW	19	NNW	15	NNE	9	„	52	„	34		25			„	27	N	35	„	22	Direction pencil not working correctly.	19	N	41	„	23	Noon.
1 p.m.	„	53	WNW	34	„	24	NW by W	14	„	10	„	54	„	34		22			NNW	28	N by W	32	„	20		18	„	36	N	19	1 p.m.
2 „	WNW	54	„	39	NW by W	27			„	7	„	51	„	31		27			N by W	31	N	36	NNW	21		16	„	36	N by E	24	2 „
3 „	„	53	NW by W	35	„	25			NNW	9	N by W	49	„	30		23			„	29	„	38	N	22		17	N by W	33	N by W	20	3 „
4 „	„	54	WNW	41	„	22			„	8	„	47	NW by N	29		22			„	26	N by W	34	„	24		16	„	35	N by E	26	4 „
5 „	„	55	„	33	„	20			NW by N	7	„	45	NNW	27		24			„	26	N	39	NNW	19		16	N	27	„	17	5 „
6 „	NW by W	57	NW by W	33	„	13			NW	8	„	45	„	30		21			„	29	N by E	35	N by W	21	Wind N.	15	„	17	N	18	6 „
7 „	„	60	WNW	37	WNW	17			„	7	„	43	„	27		23			N	34	„	36	N	27		15	NNE	23	„	31	7 „
8 „	„	56	NW by W	37	NW by W	25			NW by N	9	„	40	„	27		22			„	25	N	40	„	27		15	NE by N	18	N by W	20	8 „
9 „	NW	57		36	„	20			„	9	NNW	38	„	26		25			N by W	22	„	37	„	25		16	„	23	N by E	35	9 „
10 „	„	57	NW	32	„	13			NW	10	„	40	„	23		22	N	—	„	27	NNE	38	„	20		18	NE	22	NNE	39	10 „
11 „	„	57	NW by N	35	„	24				13	„	37	„	24		22	„	24	„	25	N	41	„	20		22	NE by N	32	NE by N	34	11 „
Midnt.	NW by N	54	„	33	„	23			NNW	14	„	35	„	23		16	„	22	N	29	„	39	„	22		20	„	18	„	42	Midnt.
Total		1,100		560		372				176		1,198		751		551				612		891		528		424		695		637	Total.

The Secretary stated that the charts for the Meteorological Atlas of the British Isles had been signed for press, and that the Preface to the work would be submitted at next meeting.

He was authorised to permit Mr. Strachan to make use of the results of his discussion of the sea surface temperatures on the coasts of the British Isles (Minutes, 1879, p. 137; 1880, p. 127).

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. C. Crutchley, R.N.R.	S.S. "Nubian"	March 18—May 24, 1883.	Cape of Good Hope and home.	1882, p. 110.
Capt. S. Griff Jones	Barque "Hermine."	July 30, 1882—May 25, 1883.	Liverpool to Talcahuano	1882, p. 24.
Capt. E. Wrake Turner.	Barque "Mertola."	Sept. 26—Dec. 20, 1882.	Liverpool to River Guadiana.	1883, p. 13.
W. B. Whall, Esq., chief officer.	R.M.S. "Drummond Castle."	March 2—May 7, 1883.	Cape Town, Natal, and home.	—

Mr. Scott was instructed to present the Charts (O. 43) to Mr. Whall, and to convey the best thanks of the Council to the other observers.

Reported—That Mr. H. G. FitzGerald had been appointed as the additional assistant in the Marine Room (Minutes, p. 13), at a salary of 2*l.* per week.

Submitted—The following reports of work for May :—

MARINE ROOM.

Examined 12 new logs.

North Atlantic Weather Charts.

Preparation and plotting of sea and land observations.

Correspondence in connexion with the despatch of forms and receipt of observations.

One clerk engaged in collecting observations from ships arriving in the ports of London and Liverpool.

(Signed) CHAS. HARDING.

The Marine Superintendent. June 5th, 1883.

H.T.

TELEGRAPHIC (FORECAST and STORM WARNING) DEPARTMENT.

Rainfall Map of the British Islands, again revised and sent "for press."

Calculation of Mean Weekly Rainfall, in each month for Stations in the Weekly Weather Report. *Completed.*

Drawing Curves of Mean Temperature and Mean Weekly Rainfall, for Stations in *Weekly Weather Report* to be used in obtaining the Mean Values for any week during the year.

Those for Rainfall, completed.

Those for Temperature, half done.

Checking Storm Warnings 1882.—Completed; results handed in.

Overtaking Arrears in Forecast Checking 1882.—*November* done; *December* one third done.

Calculating Means of Maxima and Minima Temperatures at all Telegraphic Reporting Stations, for the five years 1876–80. Half done.

Calculating Mean wet-bulb temperatures at 8 a.m. for 10 years 1871–80. Just commenced.

Preparing Notes to accompany the Pressure Temperature and Rainfall Maps with Tables. &c. Tables partly done.

Some time has also been occupied in testing the Nephoscope, a new small Anemometer (devised by Mr. Galton), and also in practising in the use of the Spectroscope.

Mr. Sargeant has been on leave for eight days.

(Signed) FREDC. GASTER.

June 1883.

PANTAGRAPH ROOM.

Copper Plates pantagraphed:—4 plates, Nos. 37 to 40, 1878.

Zinc Plates:—1878; Barograms, 8 plates, Nos. 48 to 55; Thermograms, 7 plates, Nos. 49 to 55; Vapour Tension, 4 plates, Nos. 40 to 43; Anemograms, 8 plates, Nos. 60 to 67.

Photographic Curves.—Barograms are ruled ready for the pantagraph as far as plate 60.

Harmonic Analyser.—The analysis of the barograms for 1876 has been carried as far as Stonyhurst, which station is about two-thirds done.

The weekly amounts of sunshine have been tabulated and arranged to accompany the reduced copies of the 1881 records.

R. H. Scott, Esq., F.R.S. (Signed) R. H. CURTIS.

EXAMINATION ROOM.

SIR, June 1st, 1883.

THE following *Curves* and *Tabulations* have been examined :—February 1882; *Thermograms*, two stations; *Barograms*, four stations; *Anemograms*, four stations.

March 1882; *Thermograms*, four stations; *Barograms*, one station.

The *Notes of Errors* and Monthly Report thereon for February 1882 have also been written out.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S., (Signed) T. E. ALLEN.
Secretary, Meterological Council.

Submitted—Applications (Letter 560) from several of the staff for increase of pay.

The Chairman stated that he had carefully considered the subject, and he recommended the following changes on the staff, which were approved, to take effect from July 1 :—

The following temporary clerks, being those named in the letter of the Royal Society (Minutes, 1881, p. 88*c*), with the addition of Mr. James, will henceforth be included among the junior clerks :—

In the Marine Branch—Mr. H. Harries; Mr. W. Allingham; Mr. W. G. James.
In the Telegraph Branch—Mr. R. Sargeant.
In the Pantagraph Room—Mr. C. H. Thompson; Mr. H. N. Cobley.

The following increments of salary to be granted :—

	Present.			Proposed.	Increment.		
	£	*s.*	*d.*	£	£	*s.*	*d.*
Mr. J. A. Curtis -	186	13	4	200	13	6	8
„ C. H. Thompson -	126	10	0	140	13	10	0
„ H. N. Cobley -	115	10	0	130	14	10	0
„ H. Harries -	152	10	0	160	7	10	0
„ W. Allingham -	152	10	0	160	7	10	0

In the three first cases the increment to be extended over two years, and 7*l.* 10*s.* a year, to be granted from July 1, 1883, the remainder from April 1, 1884.

In the case of the boys and youths an increment of 2*s.* per week to be granted in each case. The weekly salaries to be accordingly—

	s.
Alford, R. - - - - -	14
Bracey, C. A. - - - -	13
Brown, H. G. - - - -	10
Griffith, H. J. - - - -	17
Heinemann, C. W. - - - -	14
Parsons, W. H. - - - -	12
Powers, L. H. - - - -	9
Pycock, C. - - - - -	10
Williams, J. T. - - - -	16

Reported—That the following cheques had been drawn since the last meeting :—

			£	*s.*	*d.*
26 May.	For weekly salaries - - - - -		36	19	1
31 „	R. H. Scott, salary - - - - -		66	13	4
„ „	J. S. Harding, jun., salary - - - -		27	15	6
„ „	T. D. Bell „ - - - -		14	8	10
„ „	R. G. Canham „ - - - -		8	6	8
„ „	Gas Light and Coke Co., gas - - - -		2	17	1
„ „	W. G. Schoof, clock and repairs - - - -		1	9	6
„ „	Highgate Literary Institution, bibliography - -		1	1	0
„ „	Pickford & Co., carriage of parcels - - -		1	16	0
„ „	C. E. Strachan, Arctic work (Minutes, 10th May 1883) -		2	17	0
„ „	R. Strachan, computations (Minutes, 1882, p., 63) -		5	0	0
„ „	A. H. Bell, „ (Minutes, 14th March 1883) -		2	8	0
„ „	J. A. Curtis, „ „ „ -		3	10	3
„ „	R. H. Curtis -	Discussion, &c. of Observations.	22	4	5
„ „	J. A. Curtis -		15	11	1
„ „	T. E. Allen -		15	11	1
„ „	C. H. Thompson -		*9	14	0
„ „	E. G. Aldridge -		*7	16	8
	Carried forward - - -		£245	19	6

			£	s.	d.
		Brought forward - - -	245	19	6
31 May.	F. Gaster	Preparation, &c. of Weather Reports.	30	17	0
„ „	F. J. Brodie		19	13	0
„ „	G. G. Francis		20	12	10
„ „	A. J. Rigby		15	0	0
„ „	R. Sargeant		*11	15	8
„ „	J. E. Cullum, Valencia, salary - - - -		16	13	4
„ „	Capt. H. Toynbee -	Discussion, &c. of observations and care of instruments.	33	6	8
„ „	Nav. Lieut. C. W. Baillie, R.N.		20	16	8
„ „	R. Strachan - - -		27	15	6
„ „	C. Harding - - -		22	4	5
„ „	H. Harries - - -		*11	14	0
„ „	P. & O. Steam Navigation Co., freight - - -		0	12	6
„ „	W. Allingham, collecting synchronous observations, Minutes, 1883, p. 13 - - - - - -		7	17	2
„ „	R. H. Curtis, maps for Fishery Exhibition, Minutes, 23 May 1883 - - - - - -		13	10	0
„ „	F. Sage, glass case, &c. for do., (Minutes, 23 May 1883) -		3	5	6
„ „	R. J. Lecky, sunshine recorder frames (commissions a/c) -		26	0	0
„ „	J. S. Harding, jun., petty cash - - - -		50	0	0
			£577	13	9

116, *Victoria Street, June* 18, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 6) were read and confirmed.

Read—The following letter (Minutes, p. 1) :—

(M.O. 1308.)

Royal Cornwall Polytechnic Society,
Falmouth, June 14, 1883.

SIR,

IN reply to your letter of 17th April last, stating that the Meteorological Council will consent to receive a deputation of this Society to urge a continuance of the annual grant to them for the Falmouth Observatory, and that the Society must previously submit in writing a statement of the arguments they propose to urge on the Council, I am requested by the Committee to beg that the Meteorological Council will be good enough to appoint a day,—not later than the 27th instant,—to receive the deputation, and at such an hour as may be most convenient to themselves; and in compliance with the request contained in your letter referred to the Committee, beg to enclose a statement of the arguments which it is proposed to advance.

At the same time it must be understood that they will not confine themselves to the reasons therein set forth, as the different members of the deputation, being all very much interested in the subject, will doubtless wish to press their views before the Council.

I am, &c.
(Signed) EDW. KITTO,
Secretary.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Office,
London, S.W.

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* Four weeks ending 26th May.

Office

THE ROYAL CORNWALL POLYTECHNIC SOCIETY to the METEOROLOGICAL COUNCIL OF THE ROYAL SOCIETY.

GENTLEMEN, Falmouth, June 14, 1883.

REFERRING to your proposal to discontinue the annual grant to this Society for the maintenance of the Falmouth Observatory, communicated on 21st February last, and to your consent, by letter of 17th April last, to receive a deputation of this Society to urge a continuance of the annual grant, we beg very respectfully to state that the arguments, amongst others, which the deputation will advance in favour of the retention of the Falmouth Observatory are as follows :—

(1.) The terms on which the grant was originally made, being subject only to the passing of the Parliamentary Estimates.

(2.) The small annual cost of maintenance, viz., 250*l.*, as compared with the value and importance of the work performed, and to the annual Parliamentary Vote of 15,000*l.* to the Meteorological Council.

(3.) The important geographical position of the observatory near the entrance of the English Channel, and at the most southerly point of all the seven stations, being 2° south of Valentia, and 7° south of Aberdeen, as affording valuable data for tracing the course of storms (which very frequently approach our shores from a southerly direction) and for investigation of weather changes, and other meteorological phenomena.

(4.) The observatory has the only bright sunshine recorder in the county of Cornwall, and the only self-recording rain gauge in the west of England.

(5.) The observatory furnishes data with the consent of the Council for the purposes of scientific inquiry for the Admiralty Courts, and for Board of Trade inquiries into shipping casualties; also for publication regularly in Plymouth and local papers, and in the Polytechnic Society's reports, in addition to the primary object of sending its most complete returns to the Meteorological Office.

(6.) The observatory has always been selected to supply (by telegraph) weather information from the west, whenever telegraphic communication with the reporting station at the Scilly Isles has been interrupted.

The Secretary was instructed to reply that the Council would be happy to receive the proposed deputation on the 27th instant, at 2h. 30m. p.m. (Letter 1263).

Submitted—The following correspondence (Letter 1107) :—

DEAR SIR, Meteorological Office, May 25, 1883.

I AM instructed by the Council to inquire if the Scottish Meteorological Society would be able to furnish them with daily returns of the form adopted by them in their "Meteorological Observations from Stations of the Second Order," from certain selected stations, say four or five, in Scotland, in order to make the tables in the publication indicated, which have been drawn up to carry out the conclusions of the International Meteorological Congress, more complete.

I am to say that the Council would be prepared to reimburse the Scottish Meteorological Society any outlay needed for the object in view.

I am, &c.

J. Sanderson, Esq., (Signed) ROBERT H. SCOTT.
Hon. Treasurer, Scottish Meteorological Society.

(M.O. 1262.)

Scottish Meteorological Society, Albert Buildings,
SIR, 6, Shandwick Place, Edinburgh, June 9, 1883.

IN reply to your letter of May 25th, I am instructed to say that the Council will be happy to supply, for the purposes indicated in your letter, daily returns of the form adopted by the Meteorological Office in their "Meteorological Observations from Stations of the Second Order," it being understood that the source whence the returns have been obtained will be acknowledged in the publication.

I am, &c.

R. H. Scott, Esq., Secretary, (Signed) J. SANDERSON,
Meteorological Society. Hon. Treasurer.

(Letter 1246.)

SIR, Meteorological Office, June 13, 1883.

I AM instructed by the Chairman to ask you if you will kindly select five of your stations which you consider most truly representative of Scotland, remembering the stations from which returns have been published by us for 1879.

I forward sheets for the year 1880, and shall be glad to receive the data for January as soon as possible, as that month is actually in the press. The source whence the returns have been obtained will, of course, be acknowledged, as in the case of the English Meteorological Society.

I am, &c.

J. Sanderson, Esq., M.D., (Signed) R. H. SCOTT,
Hon. Treasurer, Scottish Meteorological Society. Secretary.

The draft Preface of the Meteorological Atlas for the British Isles was submitted, and ordered to be set up in type.

SUBMITTED—The following STATEMENT respecting the RECORDS for March 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:— Action	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good.	Direction. Good	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes	*1 hr.	0	0	0	0	0	0	0	1 hr.†	0	0	0	0	0
Orientation verified	—	—	4th & 31st	—	16th	—	4th	—	—	—	23rd	—	13th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	3	1	0	0	2	0	1	0	2	2	6
Result of 40 *Remeasurements*:—														
Greatest difference	0·0	1·0	1·0	2·0	1·0	2·0	0·0	2·0	0·0	1·0	0·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·6	0·0	0·6	0·0	0·4	0·0	0·5	0·0	0·2	0·0	0·5	0·1	0·7
Residual difference (— Meteorological Office)	0·0	0·0	0·0	0·0	0·0	−0·1	0·0	−0·2	0·0	0·0	0·0	−0·1	0·0	0·0
RAIN GAUGE:— Action	Good.		Good.		Indifferent.		Good.		Good.		Good.		Indifferent.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
„ „ other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		2		0		2		0		0		0	

BAROGRAPH :—															
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.		
Photography	Do.		Do.		Do.		Indifferent.		Do.		Do.		Do.		
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0		
,, ,, failure of light	0		0		1 hr.		0		0		4 hrs.		0		
,, ,, other causes	0		0		0		0		0		0		0		
No. of errors discovered—															
In entry of standard	0		1		4		1		3		3		0		
,, calculating residual correction	1		0		1		0		0		0		0		
,, applying residual correction	1		0		0		3		0		0		0		
,, subtraction in subsidiary tables	1		0		3		0		0		5		0		
,, tabulation by subsidiaries	0		0		0		0		0		0		0		
,, ,, irregular differences	0		2		1		1		0		1		0		
Result of 40 *Remeasurements :—*															
Greatest difference	·005		·006		·005		·008		·008		·007		·006		
Mean difference irrespective of sign	·002		·002		·002		·003		·003		·003		·002		
Residual difference (—Meteorological Office)	—·001		·000		+·001		·000		+·002		+·001		—·001		
Mean monthly difference between simultaneous Barograph and Barometer readings	·002		·002		·001		·002		·002		·001		·002		
THERMOGRAPH :—															
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.		
Photography	Do.		Do.		Indifferent.		Indifferent.		Do.		Do.		Indifferent.		
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	1 hr.	1 hr.	0	0	0	0	
,, ,, failure of light	0	0	0	0	1 hr.	1 hr.	0	0	0	1 hr.	0	0	0	0	
,, ,, imperfectly moistened bulbs	—	0	—	1 hr.	—	6 hrs.	—	3 hrs.	—	5 hrs.	—	2 hrs.	—	1 hr.	
,, ,, partially frozen bulbs	—	38 hrs.	—	9 hrs.	—	0	—	24 hrs.	—	6 hrs.	—	6 hrs.	—	0	
,, ,, other causes	§1 hr.	§1 hr.	0	0	0	0	0	0	0	0	0	0	‡3 hrs.	‡3 hrs.	
No. of errors discovered in entry of Standard	0	0	0	2	0	0	0	1	0	1	0	0	0	0	
,, ,, by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
,, ,, of subtraction in do. tables	0	0	0	2	1	2	4	0	4	2	0	1	0	1	
,, ,, detected under glass scale	0	0	1	0	0	0	2	0	0	0	0	0	1	0	
Result of 40 *Remeasurements :—*															
Greatest difference	0·3	0·2	0·2	0·2	0·3	0·3	0·3	0·4	0·2	0·3	0·2	0·2	0·3	0·2	
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	
Residual difference (—Meteorological Office)	—0·1	0·0	0·0	0·0	0·0	0·0	0·0	—0·1	—0·1	+0·1	0·0	0·0	+0·1	0·0	
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0·2	0·2	0·2	0·1	0·1	0·1	0·2	0·2	0·1	0·2	0·1	0·1	0·1	0·1	
No. of errors in maxima and minima	0	—	0	—	0	—	2	—	7	—	3	—	1	—	

* Orienting instrument. † Oiling instrument. ‡ Clock line broken. § Changing curves.

The GLASGOW work was re-tabulated before examination.

Submitted—The following report:—

In accordance with the Chairman's request on Saturday, the 9th instant, I have the honour to report that Mr. Allingham was recalled from Liverpool and returned to work in the Office on Tuesday, the 12th instant. Since that date he has been employed on the examining of forms and new logs; by this means Mr. Harries has been released for the work of drawing isobars over the land, whilst Mr. C. Harding has devoted his spare time to the isobars of both land and sea.

The examining of forms is in good working order.

Some progress has been made with isobars, and those for America and North-western Europe have been drawn on twelve of the daily charts for August. The only isobars available for Germany, Spain, Italy, and Russia are those for 8 a.m.; Germany, however, records 2 p.m. observations with which the 8 a.m. observations can be interpolated for getting isobars at Greenwich noon. With regard to the other countries no interpolation can be made, and I shall be glad to have instructions as to what method is to be followed in dealing with them. It might be thought well to plot the synchronous observations made in these countries, from which isobars and wind arrows could be drawn.

The preparing of forms has fallen still further in arrear, owing to the fact that Mr. Fitzgerald finds the work too technical, and much of Mr. James's time has been devoted to training him and testing his work. This does not, however, hinder the work, as there are plenty of forms prepared to keep the plotting going on. A favourable opportunity will be chosen for trying Miss Anderson on the preparing of forms, as Mr. Fitzgerald is about to leave.

It may be well to say that, in case the Council think of publishing isotherms over the land, no European country gives them more than once a day, viz. at 8 a.m., so that no interpolation can be made to reduce them to Greenwich noon.

I shall, therefore, be glad to know whether the Council will be satisfied with 8 a.m. isotherms over Europe, or whether they wish to have the Greenwich noon temperatures plotted, &c., to have isobars drawn from them? I shall also be glad to know the hour for which the Council wish the air and sea isotherms to be drawn over the North Atlantic.

(Signed) HENRY TOYNBEE,
Marine Superintendent.
June 18, 1883.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

The Report of the Office for the year 1882–3 was approved, and the Chairman was requested to forward it to the Royal Society.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting eight logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Lieut. A. Carpenter, Lieut. A. Balfour.	H.M.S. "Magpie."	Jan. 1—April 30, 1883.	Surveying in China and Japan Seas.	1880, p. 110.
Capt. J. Metcalfe -	S.S. "Oceanic" -	Oct. 8, 1881—Sept. 13, 1882.	San Francisco and Yokohama.	1881, p. 125.
Capt. J. H. Stiven	"Arethusa" -	Aug. 29, 1882—June 2, 1883.	Liverpool, Adelaide, and home.	1882, p. 42.
Capt. H. Walker -	S.S. "Parthia" -	Jan. 8—June 1, 1883.	New York, three voyages, Boston, one voyage.	—

Mr. Scott was instructed to present the Charts (O. 32) to Captain Walker, and to convey the best thanks of the Council to the other observers.

The Chairman and Mr. Galton, as requested at last meeting, submitted the following report:—

We recommend that the following changes be ultimately made in the telegraphic reporting system, when funds become available for the purpose, and that new stations be established at—

1. Clifden, or perhaps Slyne Head.
2. Malin Head (Lloyd's station).
3. Skerries, near Dublin.
4. Loch Indaal, Islay, or Mull.
5. Loch Boisdale, South Uist.
6. A station in the Orkneys.
7. North Unst.
8. Land's End (supplementary in case of Scilly breaking down).

The erection of an anemometer *at Valencia* on the hill of Gookaun (877 feet), electrically connected with the observatory, is desirable.

At Ardrossan the wind observations are not satisfactory, and their improvement, or the substitution of a more satisfactory station in the neighbourhood, is desirable.

At Hawes Junction the observer should cease to send telegraphic reports, but should continue to take the observations and send in monthly or weekly returns.

The station at *Sumburgh Head* might be discontinued, if those in the Orkneys and North Uist were established.

It is desirable that reports for 6 p.m. be received direct from Cuxhaven and Helder, and that reports from Corunna or Lisbon should come by Eastern Telegraphic Company's line direct, at 8 a.m. and 6 p.m.

Mr. Galton reported that the performance of the small anemometer for telegraphic stations was fairly satisfactory, and it was resolved that six should be ordered as soon as an improved pattern of instrument with certain alterations shall have been submitted to Mr. Galton.

Reported—That eight terrestrial radiation thermometers had been ordered, at 17*s* apiece. Approved.

Reported—That the following cheques have been drawn since the last meeting:—

			£	*s.*	*d.*
2nd June.		For weekly salaries - - - -	37	17	5
7th	„	Paymaster General, Stationery Office forms -	3	6	6
„	„	T. Slater, acting reporter at Holyhead -	0	14	0
„	„	Malby & Sons, special printing - -	5	0	0
9th	„	For weekly salaries - - - -	38	4	1
14th	„	F. Gaster, inspections - - -	5	11	5
„	„	W. C. Ley „ - - - -	20	0	0
16th	„	For weekly salaries - - - -	38	4	1
		Total -	£148	17	6

116, *Victoria Street, June* 27, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE.	PROFESSOR STOKES.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 18) were read and confirmed.

The Secretary announced the death of Mr. W. Spottiswoode, President of the Royal Society, which had taken place on the day of meeting. Resolved—

> The Meteorological Council desire to record their sincere regret at the death of Mr. Spottiswoode, the President of the Royal Society, whose loss will be keenly felt and deplored by all those who have known him in his official capacity or who have had the advantage of his friendship.

The Chairman was requested to forward a copy of this resolution to Mrs. Spottiswoode.

The deputation from the Royal Cornwall Polytechnic Society attended (Minutes, p. 33), and submitted the following memorial:—

MEMORIAL of the ROYAL CORNWALL POLYTECHNIC SOCIETY to the METEOROLOGICAL COMMITTEE of the ROYAL SOCIETY.

GENTLEMEN,

REFERRING to your proposal to discontinue the annual grant to this Society for the maintenance of the Falmouth Observatory, communicated on the 21st February last, and to your consent (by letter of 17th April last) to receive a deputation of this Society to urge a continuance of the annual grant, we beg very respectfully to submit the following reasons why, in our opinion, the Falmouth Observatory should continue to receive the annual grant for its maintenance in full working order:—

1. The terms on which the grant was originally made makes the annual allowance of 250*l.* dependent only on the passing of the Parliamentary Estimates.

2. The small annual cost of maintenance, viz., 250*l.*, as compared with the value and importance of the work performed, and with the Annual Parliamentary Vote of 15,300*l.* to the Meteorological Council.

3. The important geographical position of the observatory near the entrance of the English Channel, and at the most southerly point of all the stations—being 2° south of Valentia, and 7° south of Aberdeen—as affording valuable data for tracing the course of storms (which very frequently approach our shores from a southerly direction), and for investigation of weather changes and other meteorological phenomena.

4. The observatory has the only bright sunshine recorder in the county of Cornwall, and the only self-recording rain gauge in the West of England.

5. The observatory furnishes data, with the consent of the Council, for the purpose of scientific inquiry; for the Admiralty Courts, and for Board of Trade inquiries into shipping casualties; also for publication regularly in the Plymouth and local papers, and in the Polytechnic Society's Reports, in addition to the primary object of sending the most complete returns regularly to the Meteorological Office.

The observatory has always been selected to supply (by telegraph) weather information from the West whenever telegraphic communication with the reporting station at the Scilly Isles has been interrupted.

7. It has been the means of stimulating the study and knowledge of the science of Meteorology in the West of England, and its returns are valued exceedingly by the public, and form a standard for private observers throughout the county and beyond its borders, furnishing as it does the most reliable data for determining the climate of the South and West of England.

The deputation was composed of the following noblemen and gentlemen :—

The Earl of Mount Edgcumbe, President.

The Earl of St. Germans.	Howard Fox, Esq.
The Lord Robartes.	D. J. Jenkins, M.P.
C. D. Acland, M.P.	Sir Joseph W. Pease, Bart., M.P.
Professor J. C. Adams, F.R.S.	W. C. Pendarves, Esq.
Professor W. G. Adams, F.R.S.	C. C. Ross, M.P.
T. S. Bolitho, Esq.	Sir John St. Aubin, Bart., M.P.
Jas. Cropper, M.P.	W. W. Smyth, F.R.S.
E. E. Dymond, J.P., F.M.S.	Colonel Tremayne.
F. G. Enys, Esq.	A. Pendarves Vivian, M.P.
G. H. Fox, Esq.	Isaac Wilson, M.P.

E. Kitto, Secretary.

After opportunity had been afforded to several members of the deputation to express their views on the subject, the Chairman intimated to Lord Mount Edgcumbe that the Council would give the subject of the memorial their most careful consideration, and inform the Society of their decision at an early date. He also requested Prof. J. C. Adams to communicate to the Council in writing, the remarks he had made relative to the importance of continuing the self-recording observatories.

The deputation then withdrew.

Submitted—The following memorandum :—

June 27, 1883.

PERHAPS I ought to bring to the Council's notice a work recently published by the Dutch Meteorological Institute, on the best routes for steamers between the Channel and New York in various months of the year. It also shows the positions in which ice was seen and gives isotherms of the surface temperature of the sea. The title of the work is "Route voor Stoomschepen van het Kanaal naar New York en terug."

(Signed) HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

The subject was referred to the Hydrographer.

Mr. Scott read a Letter (No. 1,344) from Captain Hoffmeyer, announcing that he and Dr. Neumayer proposed to recommence the issue of synoptic charts of the Atlantic, and requested the sanction of the Council to his (Mr. Scott's) collecting subscriptions for the undertaking.—The required permission was granted.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting three logs had been received, two of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. D. Steven -	Barque "Inch Keith."	Oct. 3, 1882—June 18, 1883.	London, Calcutta, and home.	——
,, W. Scott -	Barque "Commewyne."	Jan. 24—June 13, 1883.	Greenock, Nickerie, and home.	1882, p. 96.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Stiven, and to convey the best thanks of the Council to Captain Scott.

Submitted—The following reports on the forecasts for the months of November and December 1882, and March 1883 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

NOVEMBER, 1882.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	31	66	49	79
,,	b	42	19	30	
,,	c	12	15	14	
,,	d	15	0	7	
Scotland, E.	a	54	35	45	87
,,	b	27	58	42	
,,	c	8	7	8	
,,	d	11	0	5	
England, N.E.	a	50	39	45	83
,,	b	38	38	38	
,,	c	4	15	9	
,,	d	8	8	8	
England, E.	a	35	35	35	79
,,	b	42	46	44	
,,	c	12	8	10	
,,	d	11	11	11	
Midland Cos.	a	35	39	37	81
,,	b	50	38	44	
,,	c	15	19	17	
,,	d	0	4	2	
England, S.	a	62	46	54	87
,,	b	27	38	33	
,,	c	11	8	9	
,,	d	0	8	4	
Scotland, W.	a	31	46	39	85
,,	b	54	38	46	
,,	c	11	12	11	
,,	d	4	4	4	
England, N.W.	a	42	38	40	80
,,	b	42	38	40	
,,	c	8	12	10	
,,	d	8	12	10	
England, S.W.	a	60	32	46	84
,,	b	32	44	38	
,,	c	8	16	12	
,,	d	0	8	4	
Ireland, N.	a	40	40	40	84
,,	b	44	44	44	
,,	c	4	12	8	
,,	d	12	4	8	
Ireland, S.	a	48	44	46	74
,,	b	20	36	28	
,,	c	20	16	18	
,,	d	12	4	8	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	33	37	35	77
,,	b	40	43	42	
,,	c	20	10	15	
,,	d	7	10	8	
Scotland, E.	a	47	37	42	80
,,	b	33	43	38	
,,	c	10	17	14	
,,	d	10	3	6	
England, N.E.	a	43	34	39	74
,,	b	30	40	35	
,,	c	20	13	16	
,,	d	7	13	10	
England, E.	a	30	27	29	75
,,	b	50	43	46	
,,	c	10	20	15	
,,	d	10	10	10	
Midland Cos.	a	37	34	36	76
,,	b	40	40	40	
,,	c	17	13	15	
,,	d	6	13	9	
England, S.	a	57	40	49	82
,,	b	33	33	33	
,,	c	3	17	10	
,,	d	7	10	8	
Scotland, W.	a	47	60	54	80
,,	b	33	20	26	
,,	c	17	17	17	
,,	d	3	3	3	
England, N.W.	a	50	37	44	84
,,	b	37	43	40	
,,	c	7	10	8	
,,	d	6	10	8	
England, S.W.	a	60	37	49	84
,,	b	23	47	35	
,,	c	17	10	13	
,,	d	0	6	3	
Ireland, N.	a	57	43	50	87
,,	b	33	40	37	
,,	c	7	10	8	
,,	d	3	7	5	
Ireland, S.	a	54	43	49	75
,,	b	23	30	26	
,,	c	13	20	17	
,,	d	10	7	8	

SUMMARY.

British Isles	a	45	42	43	82
,,	b	38	39	39	
,,	c	10	13	12	
,,	d	7	6	6	
British Isles	a	47	39	43	80
,,	d	34	39	37	
,,	c	13	14	13	
,,	d	6	8	7	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

DECEMBER, 1882.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	25	54	40	71
,,	b	38	25	31	
,,	c	29	8	19	
,,	d	8	13	10	
SCOTLAND, E.	a	25	29	27	71
,,	b	46	42	44	
,,	c	12	21	17	
,,	d	17	8	12	
ENGLAND, N.E.	a	46	38	42	71
,,	b	33	25	29	
,,	c	17	25	21	
,,	d	4	12	8	
ENGLAND, E.	a	46	54	50	84
,,	b	42	25	34	
,,	c	4	4	4	
,,	d	8	17	12	
MIDLAND COS.	a	46	54	50	76
,,	b	38	13	26	
,,	c	8	25	16	
,,	d	8	8	8	
ENGLAND, S.	a	59	46	53	84
,,	b	33	29	31	
,,	c	8	13	10	
,,	d	0	12	6	
SCOTLAND, W.	a	21	54	38	80
,,	b	50	34	42	
,,	c	8	8	8	
,,	d	21	4	12	
ENGLAND, N.W.	a	38	38	38	88
,,	b	54	46	50	
,,	c	0	8	4	
,,	d	8	8	8	
ENGLAND, S.W.	a	46	58	52	84
,,	b	38	25	32	
,,	c	12	4	8	
,,	d	4	13	8	
IRELAND, N.	a	25	71	48	71
,,	b	42	4	23	
,,	c	21	4	13	
,,	d	12	21	16	
IRELAND, S.	a	25	62	44	67
,,	b	29	17	23	
,,	c	25	0	12	
,,	d	21	21	21	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	37	57	47	75
,,	b	33	23	28	
,,	c	13	10	12	
,,	d	17	10	13	
SCOTLAND, E.	a	50	47	49	82
,,	b	33	33	33	
,,	c	7	13	10	
,,	d	10	7	8	
ENGLAND, N.E.	a	54	43	49	79
,,	b	30	30	30	
,,	c	13	20	16	
,,	d	3	7	5	
ENGLAND, E.	a	37	57	47	89
,,	b	60	23	42	
,,	c	3	7	5	
,,	d	0	13	6	
MIDLAND COS.	a	47	60	54	82
,,	b	40	17	28	
,,	c	10	20	15	
,,	d	3	3	3	
ENGLAND, S.	a	64	54	59	86
,,	b	23	30	27	
,,	c	13	13	13	
,,	d	0	3	1	
SCOTLAND, W.	a	37	40	39	76
,,	b	37	37	37	
,,	c	10	17	13	
,,	d	16	6	11	
ENGLAND, N.W.	a	27	33	30	75
,,	b	43	47	45	
,,	c	20	17	19	
,,	d	10	3	6	
ENGLAND, S.W.	a	33	64	49	81
,,	b	44	20	32	
,,	c	13	13	13	
,,	d	10	3	6	
IRELAND, N.	a	33	60	47	72
,,	b	33	17	25	
,,	c	17	3	10	
,,	d	17	20	18	
IRELAND, S.	a	43	60	52	77
	b	27	24	25	
	c	23	3	13	
	d	7	13	10	

SUMMARY.

BRITISH ISLES	a	37	51	44	77
,,	b	40	26	33	
,,	c	13	11	12	
,,	d	10	12	11	

BRITISH ISLES	a	42	52	47	80
,,	b	37	28	33	
,,	c	13	12	12	
,,	d	8	8	8	

Office

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

MARCH, 1883.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	16	62	39	80
"	b	54	27	41	
"	c	15	4	9	
"	d	15	7	11	
Scotland, E.	a	27	69	48	69
"	b	27	15	21	
"	c	23	4	14	
"	d	23	12	17	
England, N.E.	a	35	54	45	76
"	b	35	27	31	
"	c	11	19	15	
"	d	19	0	9	
England, E.	a	35	58	47	81
"	b	42	27	34	
"	c	15	8	12	
"	d	8	7	7	
Midland Cos.	a	27	58	43	79
"	b	50	23	36	
"	c	12	15	14	
"	d	11	4	7	
England, S.	a	35	50	43	83
"	b	42	38	40	
"	c	12	8	10	
"	d	11	4	7	
Scotland, W.	a	27	58	43	66
"	b	31	15	23	
"	c	15	12	13	
"	d	27	15	21	
England, N.W.	a	27	58	43	70
"	b	35	19	27	
"	c	23	12	17	
"	d	15	11	13	
England, S.W.	a	31	69	50	78
"	b	39	16	28	
"	c	15	0	7	
"	d	15	15	15	
Ireland, N.	a	31	54	43	76
"	b	31	35	33	
"	c	27	4	15	
"	d	11	7	9	
Ireland, S.	a	35	58	47	75
"	b	38	19	28	
"	c	27	12	20	
"	d	0	11	5	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	36	60	48	82
"	b	45	23	34	
"	c	19	10	15	
"	d	0	7	3	
Scotland, E.	a	32	60	46	76
"	b	42	17	30	
"	c	10	17	13	
"	d	16	6	11	
England, N.E.	a	42	65	54	76
"	b	32	16	24	
"	c	13	16	14	
"	d	13	3	8	
England, E.	a	49	52	51	86
"	b	29	42	35	
"	c	16	0	8	
"	d	6	6	6	
Midland Cos.	a	32	45	39	77
"	b	35	42	38	
"	c	23	7	15	
"	d	10	6	8	
England, S.	a	45	58	52	88
"	b	36	36	36	
"	c	13	0	6	
"	d	6	6	6	
Scotland, W.	a	39	57	48	73
"	b	26	23	25	
"	c	22	7	14	
"	d	13	13	13	
England, N.W.	a	32	55	44	78
"	b	42	26	34	
"	c	16	10	13	
"	d	10	9	9	
England, S.W.	a	58	55	57	88
"	b	26	36	31	
"	c	6	3	4	
"	d	10	6	8	
Ireland, N.	a	29	45	37	78
"	b	36	45	41	
"	c	19	3	11	
"	d	16	7	11	
Ireland, S.	a	48	58	53	79
"	b	23	29	26	
"	c	19	3	11	
"	d	10	10	10	

SUMMARY.

British Isles	a	30	59	45	76
"	b	38	24	31	
"	c	18	9	13	
"	d	14	8	11	
British Isles	a	40	56	48	80
"	b	34	30	32	
"	c	16	7	12	
"	d	10	7	8	

Submitted—The following memorandum :—

MEMORANDUM.—LAND ROOM.

June 23, 1883.

REFERRING to the conversation I had a day or two since with the Chairman and Mr. Galton on the subject of our land stations, and to the question then asked me as to the materials available for an extension of our present system, I beg to say that I have carefully gone over our own list of stations of the Second and Third Orders, and also that of the Meteorological Society, and with the following result.

The Office at the present time receives, direct, returns from in all 33 stations, 19 of which may be placed in the Second Order and 14 in the Third. Three of these latter are not worth publishing even once a day. Deducting these, there are 30 stations available, 19 giving observations at 9 a.m. and 9 p.m., and 11 giving observations at 9 a.m. only, or at 9 a.m. and some odd hour.

Of the 19 stations of the Second Order we should in the ordinary course publish 8 giving daily registers, and 5 as monthly summaries.

The Meteorological Society has 78 stations, 21 of the Second Order and 57 of the Third Order. Copies of the returns from 15 of the stations of the Second Order are supplied to the Office under the existing arrangements, and are published by us: 14 with daily registers, and one with monthly summary.

There are therefore 17 stations belonging to the Office and 63 stations belonging to the Meteorological Society, available for the further extension of the system, which should be made by increasing the number of monthly summaries, no more daily reports being needed.

In order to complete the meteorological representation of England and Wales (to which only this memorandum refers), I suggest that monthly summaries in the present form should be published from 10 additional stations; and summaries of a less complete form, deduced from observations made once a day only, from about 30 stations. The last set of summaries have not yet been published by us. The following list shows those stations likely to best answer the end in view.

R. H. Scott, Esq. J. A. Curtis.

Stations sending Observations direct to the Office.

Newton Reigny, near Penrith	Six stations sending observations at 9 a.m. and 9 p.m. To be published on the International Form B.
Peel, Isle of Man	
Aysgarth, Yorkshire	
Stokesay, Shropshire	
Chatham, Kent	
Totnes, Devonshire	
Sheffield, Yorkshire	Nine stations from which 9 a.m. observations are available.
Worksop, Nottinghamshire	
Rugby, Warwickshire	
Llandovery, Carmarthen	
Saffron Walden, Essex	
Cirencester, Gloucestershire	
Harpenden, Herts	
Cooper's Hill, Surrey	
Helston, Cornwall	

Stations in connexion with the Meteorological Society.

Alnwick, Northumberland	Four stations sending observations at 9 a.m. and 9 p.m. To be published on the International Form B.
Cramlington, Northumberland	
Leaton, Shropshire	
Downside, Somerset	
Alston, Cumberland	28 stations from which 9 a.m. observations of temperature, cloud amount, and rainfall are available.
Cockermouth, Cumberland	
Seathwaite, Cumberland	
Blackpool, Lancashire	
Blackburn, Lancashire	
Chester, Cheshire	
Boston, Lincolnshire	
Strelley, Nottinghamshire	
Cromer, Norfolk	
Burghill, Herefordshire	
Aspley Guise, Bedfordshire	
Southend, Essex	
Cardiff, Glamorganshire	
Weston-super-Mare, Somerset	
Cranleigh, Surrey	
Tunbridge Wells, Kent	
Swarraton, Hants	
Portsmouth, Hants	
Bournemouth, Hants	
Ventnor, Isle of Wight	
Worthing, Sussex	
Weymouth, Dorset	
Ilfracombe, Devon	
Cullompton, Devon	
Sidmouth, Devon	
Bude, Cornwall	
Maker, Cornwall	
Falmouth, Cornwall	

Reported that the following cheques had been drawn since the last meeting:—

		£	s.	d.
23rd June.	T. D. Bell, indexing minutes	1	16	0
„	Williams and Norgate, books	1	17	9
„	Kew Committee, waxed paper	10	0	0
„	Postmaster-General, telegrams	168	6	6
„	J. H. Woodstock, packing cases	4	16	0
„	For weekly salaries	38	4	1
„	P. Adie, repairing instruments	35	2	9
		£260	3	1

116, *Victoria Street, July* 4, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 27) were read and confirmed.

Read—A letter (No. 1,433) from the Home Office, enclosing a letter from the Secretary to the Incorporated Chamber of Commerce, Gloucester, urging "the desirability of establishing a complete system of meteorological stations throughout the United Kingdom."

The Secretary was instructed to acknowledge the receipt of the letter to the Home Office, and to request the Chamber of Commerce to give a fuller explanation of their views on the subject.

The following letter has been received (Minutes, p. 38).

M.O. 1467.

DEAR SIR, Observatory, Cambridge, July 5, 1883.

I SHALL be obliged if you will lay before the Meteorological Council the enclosed paper, which contains the substance of what I intended to say when I had the honour of forming one of the deputation from the Cornwall Polytechnic Society.

Yours, &c.
(Signed) J. C. ADAMS.

To the MEMBERS of the METEOROLOGICAL COUNCIL.

IN compliance with the wish expressed by some members of the Council at the interview of June 27th, I have great pleasure in explaining my views on the matter then discussed more clearly than I was able to *vivâ voce*.

I. First, I will say a few words about the relative value, from a scientific point of view, of a continuous record of meteorological phenomena when compared with occasional observations of the same phenomena.

In my opinion, the continuous record would be, in this case, incomparably the more valuable. When we know the laws of variation of an observed quantity, occasional observations, at intervals which may be settled beforehand, are sufficient to determine all the constant quantities which enter into the expression of the law. On the other hand, when the law of variation is in great measure or altogether unknown, as is the case with most meteorological phenomena, a continuous record may throw more light on the law or laws of variation than would be afforded by any amount of occasional observations.

I have no hesitation in expressing my belief that if we ever attain to a knowledge of the principal laws which regulate the weather, it will be as a result from continuous records and not from occasional observations.

II. In the second place, in order to study the laws of variation of any particular phenomenon, it is important to have continuous observations at different places which are not so far distant from each other as to make the circumstances of the phenomena at the different stations differ too widely from one another. In this way only will it be practicable to study and trace the progress of a wave of disturbance of any kind across a given country. From this point of view I do not think that seven stations judiciously distributed over the surface of the British Isles are at all too many. Hence I should regard the proposed abandonment of four out of these seven stations as a retrograde step which is greatly to be deprecated.

III. In the next place, I come to the circumstances which relate to the Falmouth Observatory in particular.

The unique situation of Falmouth, nearly at the mouth of the English Channel, and considerably to the south-west of any of the other principal meteorological stations, will render continuous observations made there peculiarly valuable. Most of our storms and other atmospheric disturbances

come from the south-west, and therefore they would first affect, and be recorded by, the instruments at Falmouth. Valencia is the only other station which can compare with Falmouth in this respect, and I should consider the observations at Falmouth more valuable, as its more southerly situation enables us better to trace the progress of any disturbance across the southern and the central parts of England by comparison with other observatories in those parts of England, while Valencia is too much to the north to answer this purpose.

IV. Next, I will consider the objection that has been brought against further continuing these observations, viz., that they have already been continued for 12 years, and nothing of importance has been deduced from them. Considering the complicated nature of the phenomena we are concerned with it, is not to be wondered at that little or no progress has been made in 12 years in unravelling their laws. Even in astronomy, if the fate of the Greenwich Observatory had depended on the results deduced during the first 12 years of its existence from the observations made there, the consequences to the progress of the science might have been disastrous.

The fact that we already have 12 years continuous observations at a given place makes any additional observations at the same place much more valuable. Thus 24 years continuous observations at the same place would be much more valuable for any theoretical deductions than 12 years observations at one place and other 12 years observations at a different place.

V. There can be no doubt that one of the principal astronomical conditions by which meteorological phenomena are affected consists in the varying motion of the moon in declination, and this again depends on the position of the moon's node, which takes between 18 and 19 years to perform a complete revolution. Hence it would be desirable that meteorological observations should be continued at the same place during one or more revolutions of the moon's node. This is already well recognised to be necessary in the case of tidal observations. And here I may incidentally remark, though it does not directly affect the Meteorological Council, that Falmouth would be a very important station for making continuous observations of the tides.

VI. If the present grant were withdrawn from the Falmouth Observatory, the Cornwall Polytechnic Society have not the means of keeping it up, and the abandonment of the observatory would be a heavy blow to the cultivation of meteorological science in Cornwall and the West of England generally, where there are many local stations which regard Falmouth as their scientific centre. This is a matter which ought not to be indifferent to the Meteorological Council. No doubt, it is no part of the duty of the Council to subsidize local efforts, unless indeed by means of such efforts the objects of the Council can be better and more economically carried out than would otherwise be done. I submit that this is the case in the present instance. The difference between the expenditure at Valencia, where the Meteorological Office has to defray the whole cost of the establishment, and the expenditure at Falmouth, affords some indication of the advantages to be derived from local efforts.

VII. Lastly, if it is absolutely necessary to reduce the expenditure on some branch of the work undertaken by the Meteorological Office, it may be inferred, from what I have already said, that, in my opinion, the continuous records are almost the last branch in which any reduction should take place.

(Signed) J. C. ADAMS.

Read—A memorandum from Captain Toynbee reporting that since the last meeting three logs had been received, one of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. R. S. Tannock	"Glencairn" -	Sept. 7, 1882—June 6, 1883.	Liverpool, Rangoon, and home.	1882, p. 42.

Mr. Scott was instructed to convey the best thanks of the Council to Captain Tannock.

Submitted the following report:—

SIR, Meteorological Office, June 30, 1883.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th June 1883.

The charts of sea surface temperature remain in Mr. Malby's hands, and I have been occupied in the general supervision of the printing, and in examining and correcting proofs.

Two large general charts of the world have been prepared for the International Fisheries Exhibition, showing the lines of equal sea surface temperature in the months of February and August.

The barometer charts have made considerable progress, but they are not yet sufficiently advanced to lay before the Council.

During the temporary absence of Captain Toynbee on three weeks' leave, I discharged the duties of Marine Superintendent, and I have myself been absent from duty for a fortnight, summer vacation.

I am, &c.
(Signed) C. W. BAILLIE,
Nav. Lieutenant, R.N.
H. T.

Captain Toynbee,
Marine Superintendent.

The proof of the Barometer Manual for Seamen was considered, and the Chairman was requested to revise it for publication. (Minutes, p. 27.)

The draft proofs of the Prefaces to the Meteorological Atlas of the British Isles (Minutes, 1882, p. 40), and of the Sunshine Records of the United Kingdom for 1881 (Minutes, 1882, p. 31), respectively, were submitted and approved, subject to revision by the Chairman.

Read—A letter (No 1,411) from the Meteorological Society, inquiring if the Council would allow 25*l.*, as usual, towards the cost of their inspections in 1883. —Authorized. (Minutes, 1882, p. 24.)

Read—Letter (1,405) from the Rev. Canon Cory, D.D., of Clifden, Co. Galway, reporting that neither Clifden nor Slyne Head were suitable for telegraphic reporting stations, owing to distance from the open sea, &c. (Minutes, June 27.)

The Chairman was requested to write to Mr. G. O. Trevelyan on the subject of the extension of the telegraphic system on the West Coast of Ireland.

Mr. Galton submitted a specimen of an improved anemometer for use at the telegraphic stations. (Minutes, p. 13.) It was resolved to have two of these instruments constructed, and to communicate with the Trinity House, and to request them to have them tried at some of the lighthouses or lightships, in order to compare their indications with the estimates of force or velocity formed by the lightkeepers.

Submitted the following statements of work for June 1883 :—

MARINE ROOM.

Examined 14 new logs.

North Atlantic Weather Charts.

Preparation and plotting of sea and land observations.
The drawing of isobars and air isotherms for August 1882 in progress.
Correspondence in connexion with the despatch of forms and receipt of observations.
One clerk engaged for half the month in the ports of London and Liverpool collecting observations from ships arriving in those ports.
Some time occupied in teaching a new clerk his duties. He has since left.

(Signed) CHAS. HARDING.
July 3, 1883.

The Marine Superintendent.

H. T.

TELEGRAPH (FORECAST and STORM WARNINGS) BRANCH.

Drawing Curves of Mean Temperature for stations in the Weekly Weather Report.—Completed.
Checking Arrears of Forecasts.—All completed to 31st March 1883, and Summaries for Annual Report handed in.
Calculating Means of Daily Maximum and Minimum Temperatures at all telegraphic reporting stations for the five years 1876–80.—Three fourths done.
Calculating Mean Temperature of Evaporation at 8 *a.m.* for 10 years, 1871–80.—About one-third done.
Preparing Notes and Tables to accompany the Pressure Temperature and *Rainfall* maps in the forthcoming Meteorological Atlas.—Completed and handed in.
Hay Harvest Forecasts, 1883.—System organised, and issue commenced.
During this month holidays were taken by various clerks, amounting in all to 29 working days.
The holiday time is now advancing so quickly that it is hardly likely that much *extra* work will be done during the next three or four months.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

Copper Plates pantagraphed :—12 plates, Nos. 41 to 52, 1878.
Zinc Plates :—Barograms, 7 plates, Nos. 56 to 62, 1878; Thermograms, 7 plates, Nos. 56 to 62, 1878; Vapour tension, 9 plates, Nos. 44 to 52, 1878; Anemograms, 6 plates, Nos. 68 to 73, 1878; Rain curves, 8 plates, Nos. 55 to 62, 1878.
Photographic Curves are prepared for pantagraphing, as far as Plate 66 in the case of the barograms, but the thermograms are not in advance of the zinc plates.
Harmonic Analyser.—The analysis of the barograms for 1876 has been completed, and the constants are being worked out for comparison with the calculated results. A table of differences between the calculated and instrumental results obtained from the 1876 thermograms has been prepared; and the instrument has been tested and re-adjusted during the month.
Mr. Sheerman was absent from office one week on vacation, and I was away until the 14th through illness.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

SIR, 2nd July 1883.

THE following *Curves* and *Tabulations* have been examined:—March 1882: *Barograms*, three stations; *Anemograms*, five stations.

April 1883: *Thermograms*, two stations; *Barograms*, two stations; *Anemograms*, one station.

May 1883: *Thermograms*, two stations; *Barograms*, one station.

The *Notes of Errors* and monthly report thereon, for March 1882, have been written out, and a partial examination of the work from the 1st to 9th June 1883 for all stations has been made for the inspectors of stations.

R. H. Scott, Esq., M.A., F.R.S., (Signed) T. E. ALLEN.
Secretary, Meteorological Council.

Reported—That Mr. F. E. Allum had resigned his clerkship, having been appointed to the Civil Service, and that Miss Mary L. Bradley had been appointed, on the 2nd inst., an assistant at 12*s*. 6*d*. a week, rising to 1*l*.

Reported—That the following cheques, including payments for quarterly allowances to observatories and stations, have been drawn since the last meeting:—

			£	*s*.	*d*.	£	*s*.	*d*.
June	30th.	For weekly salaries	-	-	-	36	4	1
,,	,,	R. H. Scott, salary	-	-	-	66	13	4
,,	,,	J. S. Harding, jun., salary	-	-	-	27	15	6
,,	,,	T. D. Bell ,,	-	-	-	14	8	10
,,	,,	R. G. Canham ,,	-	-	-	8	6	8
,,	,,	C. W. Jacques, rent	-	-	-	158	15	0
,,	,,	Pall Mall Coal Co., coals	-	-	-	10	10	0
,,	,,	Pickford & Co., carriage of parcels	-	-	-	1	8	7
,,	,,	J. S. Harding, sen., pension (Minutes, 1882, p. 43)	-			10	14	1
,,	,,	W. Thomas, care of Scilly anemometer (Minutes, 1879, p. 65)	1	13	8			
,,	,,	W. Thomas, meteorological reports	4	18	4			
						6	12	0
,,	,,	H. Williams, care of Holyhead anemometer (bridled), (Minutes, 1881, p. 68)	3	10	2			
,,	,,	H. Williams, care of Holyhead anemometer (ordinary)	5	1	10			
						8	12	0
,,	,,	C. Niven, Aberdeen observatory	-		-	56	3	9
,,	,,	J. L. E. Dreyer, Armagh observatory	65	10	10			
,,	,,	,, repairs and postages	2	3	10			
						67	14	8
,,	,,	W. L. Fox, Falmouth observatory	-		-	62	8	6
,,	,,	R. Grant, Glasgow observatory	-		-	58	4	6
,,	,,	Kew Committee, allowance	-		-	100	0	0
,,	,,	C. Clouston, Orkney	-		-	4	16	9
,,	,,	G. H. Aird, Seaham	-		-	2	13	9
,,	,,	S. J. Perry, Stonyhurst Observatory	-		-	55	14	6
,,	,,	J. E. Cullum, Valencia Observatory	64	2	8			
,,	,,	,, salary	16	13	4			
						80	16	0
,,	,,	G. T. Watson, care of anemometer, Yarmouth	4	6	10			
,,	,,	G. T. Watson, meteorological reports	4	8	10			
						8	15	8
,,	,,	J. O'Driscoll, rent of Valencia Observatory	-		-	25	0	6
,,	,,	R. H. Curtis	Discussion, &c. of observations.			22	4	5
,,	,,	J. A. Curtis				15	11	1
,,	,,	T. E. Allen				15	11	1
,,	,,	C. H. Thompson				*12	2	6
,,	,,	E. G. Aldridge				*9	15	10
,,	,,	J. W. Mayes, Ardrossan	-		-	1	0	0
,,	,,	Postmaster, Bundoran	-		-	1	6	0
,,	,,	H. Todd, Cambridge	-		-	4	11	0
		Carried forward	-	-	-	£954	10	7

* Five weeks ending 30th June.

			£	s.	d.	£	s.	d.
		Brought forward -	-		-	954	10	7
June	30th.	H. Mohn, Christiania - - -	-		-	5	10	0
„	„	Postmaster, Cliffony - - -	-		-	0	19	6
„	„	T. MacGowan, Donaghadee - -	-		-	0	13	0
„	„	J. Costello, Dover - - -	-		-	3	18	6
„	„	W. Brand, Dunrossness - -	-		-	3	18	2
„	„	Postmaster, „ - -	-		-	1	6	0
„	„	W. Foster, Hawes Junction -	-		-	3	18	3
„	„	G. G. Appleton, Hurst Castle -	-		-	3	18	4
„	„	Postmaster, Inverness - -	-		-	1	6	0
„	„	J. Fisher, Jersey - - -	-		-	4	5	6
„	„	Postmaster, Killarney - -	-		-	0	19	6
„	„	„ Leith - - -	-		-	0	13	0
„	„	„ Lerwick - - -	-		-	1	6	0
„	„	F. Gaster, London - - -	-		-	3	18	0
„	„	W. Berridge, Loughborough -	-		-	3	7	0
„	„	K. Kerr, Mullaghmore - -	-		-	5	4	9
„	„	M. Mackintosh, Nairn - -	-		-	0	13	0
„	„	W. D. Penny „ - -	-		-	4	4	6
„	„	W. Wickham, Oxford - -	-		-	3	12	6
„	„	G. Phillips, Parsonstown -	-		-	3	7	6
„	„	J. John, Prawle Point - -	-		-	3	5	0
„	„	S. Baker, St. Ann's Head -	-		-	4	0	1
„	„	R. W. Scaddan, Scilly - -	-		-	0	13	0
„	„	J. B. Smith, Spurn Head -	-		-	3	6	4
„	„	D. Macdonald, Stornoway -	-		-	5	11	3
„	„	Postmaster „ - -	-		-	1	6	0
„	„	„ Valencia - - -	-		-	0	13	0
„	„	„ Wick - - -	-		-	1	6	0
„	„	J. Sinclair „ - - -	-		-	3	5	0
„	„	A. Guy, York - - -	-		-	3	18	0
„	„	F. Gaster -	Preparation, &c. of Weather Reports.			30	12	8
„	„	F. J. Brodie -				19	13	0
„	„	G. G. Francis -				20	15	8
„	„	A. J. Rigby -				15	0	0
„	„	R. Sargeant -				*14	1	9
„	„	A. Buchan, salary - - -		37	10	0		
„	„	„ travelling expenses -		0	17	0		
						38	7	0
„	„	W. C. Ley, salary - - -	-		-	37	10	0
„	„	Capt. H. Toynbee -	Discussion, &c. of observations and care of instruments.			33	6	8
„	„	Nav. Lieut. C.W.Baillie, R.N.				20	16	8
„	„	R. Strachan - -				27	15	6
„	„	C. Harding - -				22	4	5
„	„	H. Harries - -				*14	12	6
„	„	J. Fowler, Cardiff agent -	-		-	10	8	10
„	„	L. Allen, Dundee „ -	-		-	5	1	2
„	„	Z. Scaping, Hull „ -	-		-	2	6	2
„	„	J. Gill, Liverpool „ -	-		-	14	14	2
„	„	G. H. Permain, Southampton agent -	-		-	5	0	0
„	„	W. Allingham, collection of synchronous observations (Minutes, May 10) -	-		-	7	5	1
„	„	J. A. Curtis, extra computations (Minutes, March 14) -		2	10	6		
„	„	J. A. Curtis, labels for Fishery Exhibition (Minutes, May 23) -		2	0	6		
						4	11	0
„	„	A. H. Bell, extra computations (Minutes, March 14) -				1	0	6
„	„	C. E. Strachan, Arctic work (Minutes, May 10) -				2	5	0
„	„	J. S. Harding, jun., petty cash - - -				60	0	0
		Total -				£1,446	1	0

* Five weeks ending 30th June.

Submitted—The following statement of accounts for the quarter ending 30th June 1883 :—

Income.	£ s. d.	£ s. d.
Balance from year 1882–3		883 15 1
Proportion of Vote for 1883–84		3,825 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	5 9 8	
(2.) Special researches	17 13 4	
(3.) Observatories and stations	25 17 6	
		49 0 6
Supply of Weather Information :		
D.W. charts and forecasts	60 4 4	
6 p.m. charts	6 5 0	
Information for Press Agencies, &c.	23 17 1	
Telegrams	62 10 1	
		152 16 6
Supply of Miscellaneous data		4 7 6
Sale of Instruments, &c. :		
Mercantile Marine account	18 11 9	
Royal Navy	8 14 6	
		27 6 3
Commission charged on work done for Colonies, &c.		18 18 10
		£4,961 4 8

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council	250 0 0	
Secretary	200 0 0	
Salaries and wages	183 10 0	
Rent, fuel, and lighting	191 12 10	
Furniture and fittings	30 9 6	
Incidental and contingent expenses	119 18 4	
Expenses contingent on Meteorological Congress	5 11 3	
Pensions	10 14 1	
		991 16 0
Special Researches		153 7 0
Land Meteorology :		
Observatories and stations	687 17 8	
Discussion and reduction of observations	336 13 7	
		1,024 11 3
Weather Information and Forecasts :		
Telegraphic reports and storm warnings	705 9 1	
Preparation and issue of reports and forecasts	365 11 0	
		1,071 0 1
Inspections :		
Salaries and travelling expenses		81 8 5
Ocean Meteorology :		
Discussion and reduction of observations	437 18 3	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments	50 0 0	
Royal Navy	22 15 0	
Mercantile Marine	146 15 7	
Distant island and coast stations	16 6 0	
		673 14 10
Balance		965 7 1
		£4,961 4 8

Liabilities.	£ s. d.
To Council	250 0 0
„ Contracts and work uncompleted	327 11 3
„ sundry creditors	428 0 4
„ balance	965 7 1
	£1,970 18 8

Assets.	£ s. d.
By cash at Bank	1,110 1 11
„ „ at Office	105 6 9
„ „ at Valencia	60 13 3
„ sundry debtors	369 16 9
„ H. M. Exchequer	325 0 0
	£1,970 18 8

Office

116, *Victoria Street, October* 19, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (July 4) were read and confirmed.

The Chairman reported that, with reference to the memorial of the Royal Cornwall Polytechnic Society (Minutes, p. 37), he had received a letter from Mr. A. Pendarves Vivian (M.O. 1520), and had replied thereto (P.C. 1470 and Reply 1723). Subsequently a question had been asked in the House of Commons on the 2nd of August by Mr. Vivian, to which Mr. Courtney had replied (M.O. 1661).

Submitted—The following letter :—

M.O. 2077.

British Association for the Advancement of Science,
22, Albemarle Street, London, W.
October 2, 1883.

SIR,

I BEG leave to communicate to you the enclosed resolution which was adopted by the General Committee of the British Association at its concluding meeting at Southport on September 26, together with a report from the Committee of Section A., upon which the resolution was founded. These were referred by that Committee to the Council of the Association for further consideration, and for taking such steps in consequence thereof as should seem to the Council to be desirable.

I remain, &c.
(Signed) T. G. BONNEY,
Secretary.

General Strachey, C.S.I., F.R.S.

That the Council of the British Association be requested to consider the report of the Committee of Section A. respecting the suppression of four of the seven principal observatories of the Meteorological Council, and to forward a copy of the same to the Meteorological Council.

The annexed report, signed as below, was adopted by the Committee of Section A., and appended to their resolution :—

"With regard to the importance of continuous, as distinguished from occasional observations, your Sub-Committee would wish to remark that continuous observations of phenomena which vary so rapidly and so irregularly as the atmospheric disturbances do, are much more valuable than any number of observations made at stated intervals. In these latter observations the salient points of any disturbances will be probably missed. Even the mean values which such observations can furnish may be greatly affected by the irregular disturbances unless the observations are continued for a very long time.

"It therefore appears to the Sub-Committee that the continuous observations now carried on at the seven principal observatories constitute a very important, perhaps the most important, part of the work performed under the superintendence of the Meteorological Council, and therefore the Sub-Committee would greatly regret the serious curtailment of these observations, which would be caused by the abandonment of four out of these seven observatories.

"To trace the gradual progress of atmospheric disturbances across the British Isles in a satisfactory manner, it appears to the Sub-Committee that seven observatories are by no means too many. After the observations have been continued for 12 years, it would be most desirable that similar observations should be carried on at the same stations without any interruption. If a break were to take place, both the observations which have been already made and those which may be made hereafter would lose much of the value which they would have had if they had been uninterrupted.

"In such very complicated phenomena as the disturbances of the atmosphere it cannot be expected that 12 years' observations would be sufficient to enable the laws which govern the phenomena to be made out. The period of the revolution of the moon's nodes, viz., 19 years, is the very least which would be likely to furnish observations from which such laws might be deduced, and probably several such periods would be necessary.

"It is to be observed that the British Isles offer the only example of an area throughout which continuous observations have been taken at stations placed tolerably close to one another, and it is therefore of special importance that these observations should not be discontinued until it shall be

ascertained that a sufficient series has been accumulated to afford the information with respect to regular changes, which observations made at close intervals can furnish. Nor should they be discontinued at all, unless it has been ascertained that information which will enable valuable forecasts to be made cannot be obtained from them. The Sub-Committee believe that important information of both kinds is to be distinctly hoped for from an adequate discussion of such observations after a sufficient series shall have been taken.

"The Sub-Committee submits as one ground of this hope the important suggestion which was made by the late Mr. Charles Burton, that the phenomena in a cyclone will differ slightly according as it is or is not followed by another. This seems unquestionable, and it is only by observations of the kind which it is now proposed to discontinue that it can be ascertained whether the amount of this difference is appreciable. If it can be detected, information of the utmost value to the theory, and which is of special practical importance in the British Isles, would be within our reach.

"It also appears to the Sub-Committee that valuable information of the other, or periodic kind, will almost certainly come into view from an adequate discussion of a sufficient series of closely placed continuous observations and it certainly cannot be maintained, without a fuller discussion of the observations than has yet been made, that the series is at present a sufficient one for this important use of it.

"The relation of several of the meteorological elements, such as temperature and moisture, to such phenomena as cyclones can only be obtained by the elimination of the larger local and periodic changes which at present mask that relation. The only hope of effecting this is in maintaining stations sufficiently close to fall within the area of the cyclone, and on this account again the Sub-Committee would deprecate the abandonment of any of the stations at which continuous observations are at present made.

"With reference to the four particular stations which it is proposed to suppress, the Sub-Committee find that there are considerations of weight attaching to them severally, in addition to the considerations common to them which have been already stated. Armagh lies midway between Valencia and Aberdeen, and Falmouth considerably to the south of any other station. These stations have on this account a special importance. Falmouth and Glasgow have a special importance arising out of the large local interest in meteorological science which they have succeeded in creating. A similar remark may be made with respect to Stonyhurst, which has also a special importance from its central situation.

"In conclusion, it seems to the Sub-Committee that it is only when the Meteorological Council have finally determined upon their methods of reduction, have applied them to the results of the self-recording observatories, and have by these means ascertained that little additional information will be obtained by a continuance of certain stations, that the time will have arrived to take this step with scientific prudence.

"If other important labours of the Council require additional funds, it would, in the opinion of the Sub-Committee, be more desirable that an application be made to the Treasury, than that the past labours of many years should be sacrificed to the present financial needs of the Council.

On the foregoing grounds the Sub-Committee consider that it would be very undesirable to allow the series of continuous observations to cease at any of the seven principal observatories under the Meteorological Council at which observations have been taken for the last twelve years."

(Signed) WILLIAM THOMSON (Chairman).
J. C. ADAMS.
G. JOHNSTONE STONEY.
BALFOUR STEWART.
S. J. PERRY.
W. GRYLLS ADAMS.
CHARLES CHAMBERS.
JAMES GLAISHER.
DONALD MCALISTER.
J. K. LAUGHTON.
G. J. SYMONS.

Southport, September 21, 1883.

Submitted—The following report:—

Meteorological Office, October 15, 1883.

SIR,

WITH reference to the Chairman's request that a report be prepared for the Council on the progress of the Charts of the North Atlantic, I have the honour to hand you the accompanying report, drawn up by Mr. C. Harding.

On the day when the Council meet, Mr. Baillie will be able to hand you several of the charts for August 1882, advanced to the stage sanctioned by the Council. The only data which these charts do not represent are sea temperature and weather.

Two reductions of the chart for August 1st, 1882, have been prepared at the Chairman's request.

With reference to the continuance of observations in the North Atlantic, I herewith hand you a memorandum prepared by Mr. C. Harding.

Yours, &c.
(Signed) HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq., F.R.S.,
Secretary,
Meteorological Council.

SIR, October 13, 1883.

I HAVE the honour to report, for the information of the Council, that the North Atlantic Weather Charts for August 1882 will be completed to the stage already sanctioned by a few days after the meeting of Council on the 19th instant.

Specimen reductions to one third and one fourth of original scale have been made of the chart for August 1st.

A few land stations have yet to be received from the Canadian Meteorological Office, but every possible effort has been made to obtain these.

The charts for September 1882 are plotted both for sea and land observations, except a batch of sea forms just received from the Paris Meteorological Office, and with this exception the tracings both of barometer and air temperature are complete for the whole of the month. The isobars and isotherms have not yet been commenced.

The table below will probably best represent the condition of the work for the several months.

It will be noticed that the number of forms prepared and ready to be plotted is often large; this is due to a wish, for the convenience of the work, that a number of forms should accumulate before re-opening the plotting on each chart.

The forming of the necessary corrections due to the barometer, &c. is being kept well up to date, and there are at present only about 350 forms in hand to be dealt with.

Dates plotted.			Ship Observations.				Land Observations.	Ship Observations.
			Total Number of Forms received.	Number of Forms plotted.	Average Number of Observations on each Chart.	Number of Forms prepared and ready to be plotted. (Approximate.)		Forms yet to be prepared for plotting. (Approximate.)
1882	August -	1 to 31	809	809	420	None	Plotted	None.
„	September	1 to 30	860	805	400	None	Plotted	55 (French).
„	October -	1 to 31	891	655	300	180	Plotted	50 (French).
„	November	1 to 30	777	653	300	120	—	3
„	December	1 to 31	756	640	320	120	—	3
1883	January -	1 to 20	670	525	250	150	—	None.
„	February -	1 to 3	698	662	330	40	—	None.
„	March -	1 to 15	705	670	380	30	—	2
„	April -	1 to 10	701	660	360	40	—	None.
„	May -	—	641	—	—	190	—	450
„	June -	—	534	—	—	130	—	400
„	July -	—	494	—	—	—	—	494
„	August -	—	383	—	—	—	—	383
1883	September	—	127	—	—	—	—	—
„	October -	—	14	—	—	—	—	—

I am, &c.
(Signed) CHAS. HARDING.
HENRY TOYNBEE,
Marine Superintendent.

CAPTAIN TOYNBEE, October 15, 1883.

To continue the collection of observations in North Atlantic, working on present system, would occupy—

Each day, two hours of a man clerk.
„ four „ boy clerk.

If we dropped the examination of shipping lists, &c., and merely sent out a re-supply of forms to regular observers, we should save the two hours each day of a man clerk. The receiving, acknowledging, and re-supply of forms could be done in about four hours each day by a boy clerk. In addition to the above time we greatly employ the spare time of a messenger boy.

(Signed) C. HARDING.
H. T.

It was resolved to continue the collection of observations by sending out forms only.

Read—Letter 2216 from Mr. C. Harding requesting permission to forward to the Meteorological Society a paper which he had drawn up on the gale of September 1 and 2 in the English Channel.

The Chairman stated he had sanctioned the use by Mr. Harding of materials in the Office for the preparation of his paper.

Resolved—That Mr. C. Harding be authorised to communicate his paper on the Storm of September 1 to the Meteorological Society, with permission to publish it in the Society's Journal as a communication from the Office, and that the Chairman should determine how far assistance should be given for the preparation of charts for the illustration of the paper.

SUBMITTED—The following STATEMENT respecting the RECORDS for April 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action - - - - - -	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, other causes -	0	0	0	0	0	0	0	0	0	0	Q	0	*2 hrs.	*5 hrs.
Orientation verified - - - - -	7th	—	29th	—	14th	—	1st & 29th	—	15th	—	26th	—	6th & 11th	—
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, irregular differences	0	0	0	5	1	0	1	1	2	0	0	0	1	12
Result of 40 *Remeasurements*:—														
Greatest difference - - - - -	0·0	1·0	1·0	2·0	1·0	1·0	2·0	1·0	0·0	1·0	0·0	1·0	1·0	2·0
Mean difference irrespective of sign - -	0·0	0·4	0·0	0·7	0·0	0·4	0·1	0·4	0·0	0·5	0·0	0·4	0·0	0·7
Residual difference (— Meteorological Office) -	0·0	−0·1	0·0	−0·1	0·0	+0·1	−0·1	0·0	0·0	−0·1	0·0	+0·1	0·0	+0·1
RAIN GAUGE:—														
Action - - - - - -	Good		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock -	0		0		8 hrs.		0		7 hrs.		0		0	
,, ,, other causes - -	0		0		0		0		0		0		0	
Errors in tabulation - - - -	0		1		0		8		0		2		6	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Do.	Indifferent.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	1 hr.
„ „ failure of light	1 hr.	0	0	0	0	3 hrs.	0
„ „ other causes	†2 hrs.	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	2	2	0	2	8	0
„ calculating residual correction	0	0	0	2	0	0	0
„ applying residual correction	1	0	0	10	0	3	2
„ subtraction in subsidiary tables	0	0	0	2	3	4	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	0	2	2	3	6	1
Result of 40 *Remeasurements :—*							
Greatest difference	0·005	0·007	0·005	0·005	0·005	0·005	0·005
Mean difference irrespective of sign	0·003	0·002	0·002	0·002	0·002	0·002	0·002
Residual difference (— Meteorological Office)	+0·001	+0·001	0·000	0·000	0·000	−0·001	0·000
Mean monthly difference between simultaneous barograph and barometer readings	0·002	0·002	0·001	0·001	0·002	0·001	0·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.		Good.			
Photography	Do.		Do.		Do.		Indifferent.		Do.		Do.		Do.		Indifferent.			
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.		
Records deficient, due to stoppage of clock	0	0	0	0	0	0	11 hrs.	11 hrs.	0	0	0	0	0	0	0	0		
„ „ failure of light	1 hr.	1 hr.	0	3 hrs.	0	0	0	0	0	0	0	0	0	0	1 hr.	0		
„ „ imperfectly moistened bulbs	—	1 hr.	—	0	—	0	—	2	—	0	—	4	—	0				
„ „ partially frozen bulbs	—	11 hrs.	—	0	—	0	—	0	—	0	—	0	—	0				
„ „ other causes	0	0	§4 hrs.	§4 hrs.	0	0	0	0	0	0	0	‡1 hr.	0	0				
No. of errors discovered in entry of standard	0	0	0	0	0	0	0	0	0	1	0	1	1	0				
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
„ „ of subtraction in do. tables	0	0	0	0	2	0	1	5	4	2	0	2	0	0				
„ „ detected under glass scale	0	0	2	2	0	0	0	0	1	1	0	0	1·	2				
Result of 40 *Remeasurements :—*																		
Greatest difference	0·2	0·3	0·2	0·2	0·2	0·2	0·2	0·4	0·4	0·4	0·2	0·2	0·2	0·4				
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1				
Residual difference (— Meteorological Office)	−0·1	0·0	0·0	0·0	0·0	−0·1	0·0	−0·1	0·0	−0·1	0·0	0·0	+0·1	−0·1				
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·2	0·1	0·1	0·2	0·2	0·2	0·2	0·1	0·1	0·1	0·2				
No. of errors in maxima and minima	0	—	2	—	0	—	4	—	2	—	4	—	4	—				

* Cleaning instrument. † Changing curves too near the hour. ‡ Chimney smoked. § Clock stopped by shutter.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 58 Logs had been received, 42 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. J. Adamson	"Roman Empire."	Sept. 27, 1882.—Sept. 25, 1883.	London, Cape, Akyab, and home.	—
Capt. A. E. Barlow	S.S. "Paramatta"	May 6—Sept. 4, 1883.	London, Calcutta, and home.	1882, p. 41.
Capt. W. Barron	S.S. "Empress"	March 10—July 11, 1883.	Hull and Hamburg trade	1882, p. 113.
Do	Do.	July 12—Oct. 5, 1883.	Do.	
Capt. E. J. Blake	"Tilkhurst"	Aug. 14, 1882—Aug. 20, 1883.	Cardiff, India, and home	1882, p. 31.
Capt. S. H. Bolton	S.S. "Tyne Queen."	April 14—Aug. 24, 1883.	Tyne to Mediterranean Ports.	1883, p. 4.
Capt. G. C. Boothby	S.S. "Circassia"	March 17—Sept. 4, 1883.	Glasgow to New York (five voyages).	—
Com. E. Bourke, R.N.	H.M.S. "Gannet."	Jan. 1—June 30, 1883.	West Coast South America and Sheerness.	1882, p. 110.
Capt. J. Buchan	Barque "Coppename."	April 27—Sept. 29, 1883.	London, Surinam, and home.	1883, p. 11.
Capt. A. Campbell	S.S. "Ethiopia"	March 28—Sept. 8, 1883.	Glasgow and New York (five voyages).	1882, p. 41.
Capt. J. Campbell	Barque "Florence."	Jan. 15—Sept. 1, 1883.	Shields to Santos, Philadelphia, and home.	1882, p. 41.
Capt. W. R. Cato (kept by Mr. R. Ladd, F.M.S.), chief officer.	S.S. "Scotia"	May 23—Oct. 3, 1883.	London, Vladivostok, and home.	1883, p. 11.
Capt. L. C. Dart	"Julia H."	March 11—Aug. 28, 1883.	Jamaica, Apalachicola, and home.	1882, p. 96.
Capt. G. Denham	S.S. "Erl King"	Nov. 2, 1882—May 12, 1883.	British ports to America	—
Capt. W. Deuchars	S.S. "Resolute"	Feb. 1—Aug. 13, 1883.	Dundee, Newfoundland, and Greenland.	1882, p. 41.
Capt. T. W. Freeman	S.S. "Bellerophon."	April 15—Aug. 10, 1883.	Liverpool, China, and home.	1882, p. 110.
Capt. D. Gray	S.S. "Eclipse"	March 19—July 31, 1883.	Peterhead to Greenland	1882, p. 41.
Capt. J. Gray	S.S. "Hope"	March 18—Aug. 16, 1883.	Do.	1881, p. 55.
Capt. C. Grey, R.N.R.	"Macmillan"	May 20, 1881—Oct. 30, 1882.	London to San Francisco viâ Cape of Good Hope.	—
Capt. J. P. Holdich, R.N.R.	"British Envoy"	June 18, 1882—Sept. 28, 1883.	Australia, San Francisco, and home.	1882, p. 15.
Lieut. Com. R. F. Hoskyn, R.N., and Lieut. H. Baker, R.N.	H.M.S. "Flying Fish."	Feb. 1—May 31, 1883.	Surveying China and Japan.	1883, p. 13.
Capt. W. P. Hughes	"Laomene"	Aug. 18, 1882—Aug. 10, 1883.	Liverpool, Calcutta, New York, and London.	1882, p. 42.
Capt. A. W. Jeffery	S.S. "Ptolemy"	April 17—June 15, 1883.	Antwerp, Brazils, and home.	1883, p. 4.
Capt. W. Legg	"Star of Greece"	Nov. 23, 1882—Sept. 11, 1883.	London, Calcutta, and home.	1880, p. 55.
Lieut.-Com. W. U. Moore, R.N. Log kept by Sub-Lieut. R. P. Adams, R.N.	H.M.S. "Dart"	Sept. 6, 1882—April 24, 1883.	Cowes to Australia	—
Capt. A Murray	S.S. "Windward"	March 12—July 16, 1883.	Peterhead to Greenland	1881, p. 55.
Capt. H. Parsell	S.S. "Baltic"	Feb. 22—June 26, 1883.	Liverpool and New York (four voyages).	1882, p. 102.
Capt. G. F. Parson	"Earnock"	Aug. 15, 1882—Sept. 30, 1883.	Glasgow, Melbourne, Bombay, and home.	1882, p. 29.
Capt. C. W. Pearson	S.S. "Strathleven."	Nov. 7, 1882—July 11, 1883.	London, Japan, New York, and Gibraltar.	1882, p. 42.
Capt. H. Pomeroy	Barque "Elissa"	July 3, 1882—July 16, 1883.	Bristol, Brazil, &c., United States, and home.	—
Capt. J. C. Prout	"Cape St. Vincent"	June 22, 1882—July 23, 1883.	London, Adelaide, Java, and home.	1882, p. 3.
Capt. T. Robinson	"Chinsura"	Nov. 8, 1882—Sept. 17, 1883.	Anger, Akyab, London	1882, p. 42.
Capt. W. L. Rosseter	"St. Kilda"	Feb. 28—Aug. 9, 1883.	Liverpool, Demerara, and home.	—

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. C. J. Russell -	"Candahar" -	Dec. 4, 1882—Sept. 13, 1883.	Liverpool, Calcutta, and home.	1882, p. 42.
Capt. W. C. Smith -	"Her Majesty" -	Oct. 11, 1882—Sept. 19, 1883.	London, Algoa Bay, East Indies, and home.	1881, p. 134.
Capt. W. H. Smith, R.N.R.	S.S. "Circassian"	May 19—Aug. 15, 1883.	Moville and N. America (three voyages).	1882, p. 75.
Capt. J. W. Thorne	Barque "Falstaff"	Aug. 18, 1882—June 5, 1883.	Newport, Mon., Calcutta, and home.	1882, p. 9.
Capt. J. Thorpe -	"Thurland Castle"	Aug. 9, 1882—June 26, 1883.	Cardiff, Cape, India, and home.	—
Capt. P. S. Tomlin -	S.S. "Balaarat"	April 1—July 28, 1883.	London, Australia, and home.	1882, p. 110.
Capt. W. J. L. Wharton, R.N. (kept by W. Richardson, Sub-Lieut., R.N.	H.M.S. "Sylvia"	Jan. 9—May 11, 1883.	Surveying Straits of Magellan and to Monte Video.	1883, p. 19.
Capt. H. P. Wight -	"Oamaru" -	Nov. 6, 1882—July 31, 1883.	Glasgow, Otago, and home.	1882, p. 42.
Capt. H. Youlden -	Barque "May Hulse."	Oct. 8, 1882—July 20, 1883.	Glasgow, S. America -	1882, p. 42.

Mr. Scott was instructed to present the Charts (O. 27) to Sub-Lieutenant Adams, and to Captains Adamson, Boothby, Denham, Grey, Pomeroy, Rosseter, and Thorpe, and O. 43 to Lieutenant Moore, and to convey the best thanks of the Council to the other observers.

Submitted—the following report :—

SIR, Meteorological Office, September 30, 1883.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th September 1883.

I have been occupied in the general supervision of the printing of the Sea Surface Temperature Charts, examining and correcting proofs. Four index charts have also been drawn from the large scale sheets. The whole of the charts are now in Mr. Malby's hands for final printing.

During Mr. C. Harding's absence on leave I have assisted Captain Toynbee with the Atlantic synchronous work.

The Mean Pressure Chart of the Atlantic Ocean for the month of August is nearly completed, and some progress has been made with the charts for the other months.

I was absent from the Office for 18 days summer vacation.

I am, &c.

(Signed) C. W. BAILLIE,
Navigating Lieutenant, R.N.

Captain Toynbee, F.R.A.S.,
Marine Superintendent.

H. T.

Read—Letter 2156 from Captain Hoffmeyer (Minutes, p. 41), stating that the first quarter of his proposed charts was nearly ready for publication, and inquiring as to the number of subscriptions obtained by the Office.

Mr. Scott reported that the names of eight subscribers had been received, including one copy for the Office. He was instructed to order six additional copies for the Office.

Submitted—The following reports :—

REPORT on the INSPECTIONS of the IRISH and WELSH STATIONS in 1883.

I HAVE to report that I have completed the inspection of the Irish and Welsh stations, with the exception of two of the second order, Londonderry and St. Davids, and of these the former is to be visited by Captain Toynbee, the latter can safely be omitted for one year.

TELEGRAPHIC REPORTING STATIONS.

Holyhead, September 15.—The new observer, Mr. Griffith Jones, is very attentive, and has improved much since his appointment in May. He is unfortunately not a seaman, and has not been much accustomed to outdoor work, so that he has not had previous experience in judging of weather. The station was in a satisfactory condition. The anemometers are both in good order.

St. Ann's Head, October 10.—This station calls for no particular remark. The exposure of sunshine recorder, thermometer, and rain gauge is the best at any of our stations.

Donaghadee, September 19.—The observer continues to be very satisfactory, but the exposure of thermometers and rain gauge is not very good, being in a rather confined garden, and in particular there is no site available for a satisfactory wind vane.

Mullaghmore, September 21.—The station is in very good order, and since the establishment of telephonic communication it has been one of our most useful points of observation. Mr. Kerr, the

reporter, is, I regret to say, to be superannuated at about the end of next year. It will be very desirable, if possible, to retain him at Mullaghmore. He is prepared to reside there if Mr. Ashley will give him a house. It is not likely that his successor, as chief officer of the coastguard, will take as much interest in the work as Mr. Kerr has done.

Belmullet, September 26.—In accordance with your instructions, I visited Belmullet. The town lies about 80 miles to the westward of Mullaghmore. It is situated on the isthmus connecting the Mullet peninsula with the mainland. Blacksod Bay, to the south, is about 15 miles long, Broadhaven, to the north, about eight, so that no direct reports of sea disturbance are procurable at Belmullet. The nearest point from which the open sea can be observed, though at a distance of a mile, is the church at Binghamstown, distant about 250 yards from the village. But that village consists of some 20 cottages, and no competent observer resides there at present. It is distant about two miles from Belmullet, and a private wire would be requisite to cover that distance.

At Belmullet itself the wind exposure is very satisfactory. There is no higher elevation than 100 feet for a long distance except the hills about Ballyglass and Erris Head, which reach 400 feet and are distant, say, four miles to the northward. The whole central part of Erris, the western barony of Mayo, is a level bog, with little elevation except along the north coast, so that the winds would be certainly true.

I learn from gentlemen resident at Belmullet that a competent observer could probably be found, but I myself have not spoken to any person who would be likely to fill the post, in order not to compromise the Council. I think the station would be a useful one, but its adoption would involve the maintenance of Mullaghmore, inasmuch as that would supply reports of sea disturbance from a well exposed headland.

I may say that the telegraphic wires will probably be laid to Belmullet before Christmas.

Parsonstown, October 1.—This station calls for no special remark, except that the actual observers for the telegraphic reports and the second order observations, respectively, are clerks in an office in the town, and cannot therefore keep such a constant watch on the clouds and weather generally as is desirable and is obtainable at coast stations. The deficiency is to some extent supplied by the occasional observations of Dr. Bœddicker, the astronomical assistant to Lord Rosse. The instruments are in good order. The wind reports continue to be unsatisfactory, as the grounds are densely wooded and the timber fine.

Roche's Point, October 2.—This station continues to be satisfactory, but the observer is not as active in sending special reports as he was in former years.

Valencia, October 1.—The station calls for no remark; the substitution of telephones for the A B C instrument on the private wire has been a great improvement, and as the telegraphic clerk at the post office has been changed, the cause of complaint as to delay in the messages has been removed.

I have examined the country between the observatory and the top of Jokaun Hill, the proposed site of an automatic electric anemometer, and I fear that the cost of erection and maintenance of a wire for about four miles in such an exposed position would be very great.

Foynes, October 6.—This is a station furnishing information for the Weekly Weather Reports. It is not very satisfactory, as the observer, Carey, is Lord Monteagle's steward, and at certain times of the year, such as harvest, he finds it very difficult to take the morning observations punctually. He is both competent and willing, but has not as yet found any assistant or substitute when he is unavoidably absent.

Stations of the Second Order.

Dublin (Mountjoy), September 17.—This station continues very satisfactory. I did not meet Sir C. W. Wilson, the Director of the Survey. The observers, Corporal Lipscomb and Sapper Dardis, are both very intelligent, and the instruments in good order. The only change in prospect at the station is that a new scaffolding for the anemometer and sunshine recorder is being erected, the old one, referred to in my report for 1878, being decayed.

Dublin (Fitzwilliam Square), September 18.—This station fully maintains its character as being as good as is possible for a town situation. Dr. Moore has requested me to draw the attention of the Council to the advisability of dividing Ireland into at least three districts, instead of two, for forecasting purposes. The province of Leinster escapes much of the rain that falls on the west coast, and again its eastern parts often have heavy rain with easterly winds, which are dry on the Welsh side of the channel. Dr. Moore himself is a very successful local forecaster for the vicinity of Dublin.

Dublin (Glasnevin), September 18.—This station is in very good order. On the whole it may be said that Dublin is as well represented climatologically as any city in the United Kingdom.

Colebrcoke, September 21.—This station continues in the same condition as heretofore. The observer, Mr. Ferguson, is rather old for the work, and has not much of a scientific bent. He is, however, careful and attentive in his readings.

I have deposited another barometer at the station, and I hope that the deficiency of about 0·05 in. noticed in the previous barometrical readings may now be explained.

Markree, September 25.—I expect that this station will show a marked improvement in future. Mr. Marth, the present observer for Colonel Cooper, took up the work in May. His predecessor, Dr. Doberck, left Europe without giving him any information as to the instruments, &c., and moreover ordered his assistant to cease observing three days before Dr. Marth's arrival. In fact there is a hiatus in the records for the first 20 days of May. The only serious defect Mr. Marth has discovered is in the rain gauge, the delivery tube of which was faulty, so that a quantity of rain was lost. All previous records of rain are thus vitiated.

The barometer is in a bad light, but the situation is convenient for the astronomical observations.

Office

OBSERVATORIES.

Armagh, September 20.—With reference to this station, I have only to remind the Council that the case of Mr. Call, who has been the observer for nearly 17 years, is a hard one. He is not a servant of the Office, and the salary the late Dr. Robinson paid him was high, but he finds great difficulty in finding other employment. I may say that he is not well educated, *e.g.*, he knows nothing of logarithms.

Valencia, October 4.—I found this observatory in a very satisfactory condition. The anemograph, however, now requires renewal, at least in the most important parts. Mr. Whipple recommended such renewal last year. The fans and cups are much worn, and the wheel work has much backlash.

If the Council think of improving the observatory, it might be advisable to lower the thermograph bulbs. This could be done at comparatively little cost, by completing the fourth side of, and roofing in, the space beneath the present thermograph screen. I am sorry to say that the roof requires pointing, and the sea wall further repairs. The sea is encroaching seriously on that part of the shore.

Meteorological Office, October 13, 1883. (Signed) ROBERT H. SCOTT.

M.O. 2140.

REPORTS on OBSERVATORIES, 1883.

In conformity with your instructions, I beg leave to report to the Meteorological Council that I inspected the self-recording observatories at Aberdeen and Valencia, and at the same time (with the concurrence of the Rev. S. J. Perry) I also visited the Stonyhurst Observatory.

Stonyhurst, September 1st and 2nd.—The whole of the instruments here were in excellent order, and neither the clocks nor the lenses required cleaning. My attention, however, having been specially called to the backleash existing in the anemograph, I carefully examined the instrument in this respect, and am of opinion that the defect cannot be obviated in its present form.

The clutches connecting the shafting to the pencils were noticed to be somewhat loose in their fittings, and Mr. Carlisle thought if these were tinned over so as to make them fit a little tighter, it might have a tendency, at all events, to improve the direction trace, so that when a sudden shift in the vane takes place the pencil would mark at once instead of lagging behind or skipping.

With this I agreed, and Mr. Carlisle promised to get it done.

The velocity shaft was dismounted, and the cup-bearing oiled, after which the orientation was carefully tested.

My attention was next called to the extremely dirty condition of the cistern of the large standard barometer used for the control observations. I therefore decided to dismount it, but experienced considerable difficulty in so doing, as the screws had become rusted, the instrument never having been detached from its frame since its erection in 1868.

The cistern was cleaned and the contained mercury filtered, after which the barometer was replaced and levelled. A comparison of the standard thermometers was made with Kew standard No. 571, and found to give the following corrections at 60°:—

Dry bulb, No. 619, −0·15. Wet bulb, No. 382, −0·35.

The rain gauge was in good order, and "squeezes" of the self-recording as well as the spare gauge funnels were taken.

Aberdeen, September 5th, 6th, and 7th.—At this observatory all the instruments were in good order.

I deemed it advisable, however, to clean the barograph and thermograph clocks, as well as the lenses and other parts generally.

The exterior portion of the anemometer was dismounted, thoroughly overhauled and cleaned, but the clock and recording apparatus only required oiling.

Afterwards the orientation was examined, and the four cardinal points checked by means of an azimuth compass, the results being satisfactory.

The rain gauge was also examined, but the clock was in such excellent order that it really only required oiling. "Squeezes" were taken of the funnels of both the Beckley and spare gauges.

The corrections to the standard thermometers at 50 degrees were found to be, as compared with Kew standard No. 571, for the dry, No. 458, 0°·0, and for the wet, No. 395, −0·55.

After testing, the graduations of the thermometers were re-blackened.

Valencia, September 14th, 17th, and 19th.—The barograph and thermograph at this observatory were in a very satisfactory condition, but at the same time I considered it desirable to clean both clocks, as well as the lenses and other parts generally.

With regard to the slight blurring in the wet bulb trace of the thermograph, it seems only to occur when the temperature ranges between 35 and 45 degrees, and is probably due to some accidental roughening of the glass at that part of the tube, as already pointed out by Mr. Whipple; but in consequence of the great risk attendant on taking the thermometer out of its fittings I did not think it advisable to dismount the tube in order to make a closer examination.

The photography at the time of my visit was good.

The corrections to the standard thermometers at 58 degrees were determined to be, as compared with Kew standard No. 571, for the dry, No. 399, −0·6, and for the wet, No. 398, −0·45; after testing, the graduations of the thermometers were re-blackened.

Anemometer.—The external parts of the anemometer were entirely dismounted and thoroughly cleaned and oiled.

The cups and stays supporting the arms are, however, in a very shaky and unsatisfactory condition. The iron is much corroded, and one of the stays is only secured by a piece of wire, so

that it is very doubtful whether the arms and cups could withstand a severe gale. I would therefore most respectfully beg to draw the special attention of the Council to Mr. Whipple's report on this instrument last year.

The orientation was examined, and the result is appended to this report; also the four principal points were checked by means of an azimuth compass, and found to agree with the marks used by Mr. Cullum for the purpose of orienting.

The rain gauge was taken to pieces and cleaned, and a new line was attached to the clock; as regards the attachment of the papers to the drum, Mr. Cullum experiences considerable difficulty, as the sheets are cut much wider than the cylinder itself.

I have, &c.

Kew Observatory,
October 11, 1883.

(Signed) T. W. BAKER.

M.O. 2141.

REPORT on SELF-RECORDING METEOROLOGICAL INSTRUMENTS at KEW OBSERVATORY.

The anemograph was entirely dismounted and thoroughly cleaned on August 23rd. During the year the cap on the oil cup of the velocity shaft has been observed on several occasions to work loose, and so cause a creaking noise for a short time. It is intended to fit a tightening screw to it as soon as a convenient opportunity of so doing presents itself.

The working parts of the instrument show very few signs of wear, although it has now been running more than 15 years.

After remounting, it was again oriented, and a slight displacement of the sheet upon the cylinder was found necessary.

Barograph.—This instrument was cleaned on August 7th. It is in perfect order and required no repairs beyond a new clock line. During the holidays of the photographic assistant, Morgan's gelatino-bromide paper was used for both first and second sheets, as the photographic operations it entails are so trivial as contrasted with those of the waxed paper process. The only objection to its continued employment lies in the fact that owing to its contractile coating it possesses a strong tendency to curl, which cannot be overcome. This sometimes causes bagging when two sheets are put on together, and the light diffusing in the space between them, the trace on the under sheet becomes blurred. Attempts are being made to overcome this defect.

Thermograph.—The Kew thermograph was dismounted, its clock and lenses cleaned, and a new cord attached to the former.

In accordance with a request contained in a letter from the Meteorological Office, dated July 30, an attempt was made to improve the definition of the wet bulb trace. The defect being due to an apparent excessively wide slit, the tube was re-blackened and a new and narrower slit made. Using, however, the gelatinised paper, it became evident that a good deal of stray light found its way through the blackening, and on the return of Mr. Baker, the thermometer was again taken out, cleaned, and re-blacked on October 8th. This operation was not successful, and on the 9th it was repeated, and found that owing to the narrowness of the bore it was extremely difficult to admit light to the air speck whilst excluding it from sides of the tube, the tube itself acting as a cylindrical lens. In these operations the shield was of necessity removed from the tube, and the zero values will probably experience a slight change.

The dry-bulb thermograph tube was not touched in the above experiment, and its zero values remain at 80·6 degrees for the upper and 22·1 for the lower.

The standards were tested as usual in ice at the beginning of the year, and the following corrections were then determined:—

Dry bulb, No. 378, $-0°\cdot4$. Wet bulb, 473, $-0°\cdot4$

The rain gauge was cleaned and clock line renewed on June 18, being found in perfect order.

The sunshine recorder is also in good order, the sphere being cleaned from time to time as required.

(Signed) G. M. WHIPPLE.

Kew Observatory,
11th October 1883.

Read—Letter 1787 from the Chief Signal Office, Washington, stating that the Office was unable to continue the payment for the synchronous observations forwarded by the Meteorological Council. Mr. Scott was authorised to have the materials from the Royal Navy logs copied and forwarded gratuitously to Washington.

Submitted—The Quarterly Weather Report for 1877 (appendices and plates).

Mr. Scott reported that the plates for 1878 would be completed by the 1st of November, so that the entire series of records for 12 years, 1869 to 1880, would have been engraved.

Reported—That the following changes have been made in the Office arrangements:—

Miss J. F. Baird was engaged as an assistant on 23rd July, at a salary commencing at 12*s.* 6*d.* per week, and rising to 1*l.* a week, according to proficiency, as in other cases (see Minutes, 1882, p. 86).

The office-keeper, Mr. R. Canham, having been found unsuitable for the duties required of him, was transferred to his former place in the Land Room, and his salary was reduced to 1*l.* 10*s.* per week as before, from the 1st October.

Mr. E. Wall, the engraver, was offered, and he accepted, the post of office-keeper, from such time as he is able to complete his present work, at a salary of 2*l.* 2*s.* a week, commencing on the 1st October.

Mr. J. T. Williams was requested to act as office-keeper until Mr. Wall took up his duties, and his salary was raised to 1*l.* per week, from the 30th July.

Submitted—The following statement of accounts for the six months ending 30th September 1883:—

Income.	£ s. d.	£ s. d.
Balance from year 1882–83		883 15 1
Proportion of vote for six months		7,650 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	11 2 0	
(2.) Special researches	17 13 4	
(3.) Observatories and stations	25 17 6	
		54 12 10
Supply of Weather Information:		
D.W. Charts and Forecasts	127 15 2	
6 p.m. Charts	12 10 0	
Information for Press Agencies, &c.	47 9 7	
Telegrams	120 13 4	
Miscellaneous data	5 6 5	
		313 14 6
Sale of Instruments, &c.:		
Mercantile Marine account	29 13 7	
Royal Navy	20 12 6	
		50 6 1
Commission charged on work done for Colonies, &c.		26 17 3
		£8,979 5 9

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	500 0 0	
Secretary	400 0 0	
Salaries and wages	368 6 0	
Rent, fuel, and lighting	354 14 1	
Furniture and fittings	35 19 6	
Incidental and contingent expenses	229 8 8	
Expenses contingent on Meteorological Congress	5 11 3	
Pensions	21 8 2	
		1,915 7 8
Special Researches		289 6 0
Land Meteorology:		
Observatories and stations	1,274 7 7	
Discussion and reduction of observations	683 12 5	
		1,958 0 0
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	1,468 18 10	
Preparation and issue of reports and forecasts	734 4 0	
		2,203 2 10
Inspections:		
Salaries and travelling expenses		220 10 4
Ocean Meteorology:		
Discussion and reduction of observations	*871 0 0	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	100 0 0	
Royal Navy	88 7 0	
Mercantile Marine	279 10 10	
Distant island and coast stations	22 3 0	
		1,361 0 10
Balance		1,031 18 1
		£8,979 5 9

Liabilities.	£ s. d.
To Council	500 0 0
„ sundry creditors	784 19 8
„ balance	1,031 18 1
	£2,316 17 9

Assets.	£ s. d.
By cash at Bank	734 7 11
„ „ at Office	126 13 7
„ „ at Valencia	50 0 0
„ sundry debtors	255 16 3
„ H.M. Exchequer	1,150 0 0
	£2,316 17 9

* Some accounts outstanding under this head.

Reported—That the following cheques, including payments for quarterly allowances to observatories and stations, have been drawn during the last quarter:—

1883.		£	s.	d.
7th July.	H. Bond & Son, furniture and office fittings	27	5	0
,, ,,	Steel & Jones, newspapers	11	6	0
,, ,,	R. H. Curtis, engraving thermometer scale	1	16	0
,, ,,	F. Dangerfield, delivery of Daily Weather Charts	12	7	9
,, ,,	R. Riviere, labels on presentation charts	1	16	0
,, ,,	H. Wild, synchronous observations	2	13	3
,, ,,	For weekly salaries	30	7	5
14th ,,	Do.	30	7	5
,, ,,	Kew Committee, verifications and expenses	43	11	1
,, ,,	Meteorological Society, inspections (Minutes, 1879, p. 82)	25	0	0
,, ,,	H. Harries, diagrams for Fishery Exhibition (Minutes, Jan. 17)	1	13	2
,, ,,	Nautical Magazine, advertisements	2	5	0
21st ,,	For weekly salaries	29	7	5
28th ,,	Do.	29	7	5
31st ,,	R. H. Scott, salary	66	13	4
,, ,,	J. S. Harding, jun., salary	27	15	6
,, ,,	T. D. Bell ,,	14	8	10
,, ,,	R. G. Canham ,,	8	6	8
,, ,,	R. H. Curtis — Discussion, &c. of observations	22	4	5
,, ,,	J. A. Curtis — Discussion, &c. of observations	16	3	7
,, ,,	T. E. Allen — Discussion, &c. of observations	15	11	1
,, ,,	C. H. Thompson — Discussion, &c. of observations	11	3	4
,, ,,	H. N. Cobley — Discussion, &c. of observations	10	5	11
,, ,,	E. G. Aldridge — Discussion, &c. of observations	*7	16	8
,, ,,	J. E. Cullum, salary	16	13	4
,, ,,	F. Gaster — Preparation, &c. of Weather Reports	31	10	0
,, ,,	F. J. Brodie — Preparation, &c. of Weather Reports	19	18	8
,, ,,	G. G. Francis — Preparation, &c. of Weather Reports	19	1	8
,, ,,	A. J. Rigby — Preparation, &c. of Weather Reports	15	0	0
,, ,,	R. Sargeant — Preparation, &c. of Weather Reports	14	2	3
,, ,,	Captain H. Toynbee — Discussion, &c. of observations, and care of instruments.	33	6	8
,, ,,	Nav. Lieut. C. W. Baillie, R.N. — Discussion, &c. of observations, and care of instruments.	20	16	8
,, ,,	R. Strachan — Discussion, &c. of observations, and care of instruments.	27	15	6
,, ,,	C. Harding — Discussion, &c. of observations, and care of instruments.	22	4	5
,, ,,	H. Harries — Discussion, &c. of observations, and care of instruments.	13	6	8
,, ,,	W. Allingham — Discussion, &c. of observations, and care of instruments.	13	6	8
,, ,,	W. G. James — Discussion, &c. of observations, and care of instruments.	9	12	0
,, ,,	R. Strachan, petty cash	50	0	0
,, ,,	Postmaster-General, telegrams	159	1	6
,, ,,	C. E. Strachan, Arctic work (Minutes, May 10)	2	5	0
4th Aug.	For weekly salaries	29	11	5
11th ,,	Do.	26	15	5
18th ,,	Gas Light and Coke Co., gas	3	7	9
,, ,,	W. Marriott, calculating meteorological means (Minutes, 1881, p. 98)	6	1	3
,, ,,	J. A. Curtis, extra computations (Minutes, March 14)	2	12	3
,, ,,	Postmaster-General, telegrams	164	15	10
,, ,,	W. Allingham, collection of synchronous observations (Minutes, May 10)	8	11	7
,, ,,	For weekly salaries	31	17	5
25th ,,	Do.	29	4	5
31st ,,	R. H. Scott, salary	66	13	4
,, ,,	J. S. Harding, jun., salary	27	15	6
,, ,,	T. D. Bell ,,	14	8	10
,, ,,	R. G. Canham ,,	8	6	8
,, ,,	J. E. Cullum ,,	16	13	4
	Carried forward	£1,355	1	3

* Four weeks ending 28th July.

1883.			£	s.	d.	£	s.	d.
		Brought forward -	-		-	1,355	1	3
31st Aug.	R. H. Curtis -	Discussion, &c. of observations -				22	4	5
„ „	J. A. Curtis -					16	3	7
„ „	T. E. Allen -					15	11	1
„ „	C. H. Thompson -					11	3	4
„ „	H. N. Cobley -					10	5	11
„ „	E. G. Aldridge -					*7	16	8
„ „	F. Gaster -	Preparation, &c. of Weather Reports -				27	12	0
„ „	F. J. Brodie -					21	15	6
„ „	G. G. Francis -					21	1	4
„ „	A. J. Rigby -					15	0	0
„ „	R. Sargeant -					12	7	5
„ „	Capt. H. Toynbee - - -	Discussion, &c. of observations and care of instruments.				33	6	8
„ „	Nav. Lieut. C. W. Baillie, R.N. -					20	16	8
„ „	R. Strachan - - -					27	15	6
„ „	C. Harding - - -					22	4	5
„ „	H. Harries - - -					13	6	8
„ „	W. Allingham - - -					13	6	8
„ „	W. G. James - - -					9	12	0
„ „	W. Allingham, collection of synchronous observations (Minutes, May 10) - - - - -					3	3	10
„ „	Stationery Office, sale of forms - - - -					3	8	4
„ „	C. E. Strachan, Arctic work (Minutes, May 10) - -					3	15	0
„ „	J. H. Woodstock, packing cases - - - -					3	3	3
„ „	J. S. Harding, junr., petty cash - - - -					50	0	0
1st Sept.	For weekly salaries - - - - -					28	17	5
4th „	Pickford & Co., carriage of parcels - - -					1	5	4
„ „	Wightman & Co., printing wrappers, &c. - - -					13	16	6
„ „	R. Strachan, portable meteorological registers - -					4	7	6
„ „	Donald Currie & Co., freight - - - -					1	8	0
8th „	For weekly salaries - - - - -					28	17	5
11th „	F. Hatchett, aniline copying plates - - -					1	2	0
„ „	O. T. Olsen, books - - - - -					2	2	0
„ „	Paul, Trench, & Co., books - - - -					2	16	0
„ „	R. W. Munro, alterations to self-recording instruments -					2	15	0
„ „	Negretti & Zambra, instruments and repairs - -					100	10	6
„ „	D. McGregor & Co., Glasgow agents - - -					7	5	5
„ „	Pewtress & Co., printing - - - - -					3	0	0
„ „	L. P. Casella, instruments - - - -					10	12	0
13th „	R. H. Scott, inspections, on account - - -					50	0	0
„ „	Postmaster-General, telegrams - - - -					166	2	1
„ „	International Fisheries Exhibition, counter space (Minutes, January 17) - - - - - -					5	4	0
„ „	W. G. James, diagrams for Barometer Manual - -					0	18	0
15th „	For weekly salaries - - - - -					28	17	5
22nd „	Do. - - - - - - -					28	17	5
29th „	Do. - - - - - - -					28	17	5
„ „	R. H. Scott, salary - - - - -					66	13	4
„ „	J. S. Harding, jun., salary - - -					27	15	6
„ „	T. D. Bell „ - - - -					14	8	10
„ „	R. G. Canham „ - - - -					8	6	8
„ „	C. W. Jacques, rent - - - - -					158	15	0
„ „	J. S. Harding, sen., pension - - - -					10	14	1
„ „	W. Thomas, care of Scilly anemometer -		1	18	9			
„ „	„ meteorological reports -		5	13	0			
						7	11	9
„ „	H. Williams, care of Holyhead anemometer (bridled) - - -		2	10	6			
„ „	„ care of Holyhead anemometer (Robinson's) - -		2	13	4			
						5	3	10
		Carried forward - -			-	£2,557	1	11

* Four weeks ending 25th August.

		£	s.	d.	£	s.	d.
1883.	Brought forward -	-		-	2,557	1	11
29th Sept.	C. Niven, Aberdeen Observatory - -	-		-	68	15	0
,, ,,	J. L. E. Dreyer, Armagh ,, - -	-		-	68	15	0
,, ,,	W. L. Fox, Falmouth ,, - -	-		-	62	10	0
,, ,,	R. Grant, Glasgow ,, - -	-		-	68	15	0
,, ,,	Kew Committee, allowance - -	-		-	100	0	0
,, ,,	C. Clouston, Orkney - - -	-		-	2	19	3
,, ,,	G. H. Aird, Seaham - - -	-		-	2	16	4
,, ,,	S. J. Perry, Stonyhurst Observatory -	-		-	55	11	7
,, ,,	J. E. Cullum, Valencia ,, -	42	19	11			
,, ,,	,, salary - - -	16	13	4			
					59	13	3
,, ,,	G. T. Watson, care of Yarmouth anemometer	4	2	0			
,, ,,	,, meteorological reports -	4	1	6			
					8	3	6
,, ,,	R. H. Curtis -				22	4	5
,, ,,	J. A. Curtis -				16	3	7
,, ,,	T. E. Allen -				15	11	1
,, ,,	C. H. Thompson - } Discussion, &c., of observations				11	3	4
,, ,,	H. N. Cobley -				10	5	11
,, ,,	E. G. Aldridge -				*9	15	10
,, ,,	J. W. Mayes, Ardrossan - - - - -				1	5	0
,, ,,	Postmaster, Bundoran - - - - -				2	14	4
,, ,,	H. Todd, Cambridge - - - - -				4	11	0
,, ,,	H. Mohn, Christiania - - - - -				5	10	0
,, ,,	Postmaster, Cliffony - - - - -				2	7	4
,, ,,	T. MacGowan, Donaghadee - - - -				0	14	0
,, ,,	J. Costello, Dover - - - - -				3	18	6
,, ,,	W. Brand, Dunrossness - - - - -				3	18	3
,, ,,	Postmaster, ,, - - - - -				1	8	0
,, ,,	W. Foster, Hawes Junction - - - -				3	18	3
,, ,,	G. Jones, Holyhead - - - - -				5	6	0
,, ,,	G. G. Appleton, Hurst Castle - - - -				3	18	9
,, ,,	Postmaster, Inverness - - - - -				1	8	0
,, ,,	J. Fisher, Jersey - - - - - -				4	5	6
,, ,,	Postmaster, Killarney - - - - -				1	1	0
,, ,,	,, Leith - - - - - -				0	14	0
,, ,,	,, Lerwick - - - - -				1	8	0
,, ,,	F. Gaster, London - - - - -				3	18	0
,, ,,	W. Berridge, Loughborough - - - -				3	5	10
,, ,,	K. Kerr, Mullaghmore - - - - -				5	4	9
,, ,,	M. Mackintosh, Nairn - - - - -				0	14	0
,, ,,	W. D. Penny ,, - - - - -				4	4	6
,, ,,	W. Wickham, Oxford - - - - -				3	12	6
,, ,,	G. Phillips, Parsonstown - - - - -				3	7	6
,, ,,	E. Kennedy ,, - - - - -				0	13	6
,, ,,	J. John, Prawle Point - - - - -				3	5	0
,, ,,	W. Kennedy, Roche's Point - - - -				0	13	6
,, ,,	G. Baker, St. Ann's Head - - - -				4	1	4
,, ,,	Postmaster, Scilly - - - - - -				0	14	0
,, ,,	J. B. Smith, Spurn Head - - - - -				3	5	6
,, ,,	D. Macdonald, Stornoway - - - - -				5	11	4
,, ,,	Postmaster, Stornoway - - - - -				1	8	0
,, ,,	,, Valencia - - - - - -				0	14	0
,, ,,	,, Wick - - - - - -				1	8	0
,, ,,	J. Sinclair ,, - - - - - -				3	5	0
,, ,,	A. Guy, York - - - - - - -				3	18	0
,, ,,	Postmaster-General, wire at Valencia - - -				20	15	0
	Carried forward - - -				£3,251	17	2

* Five weeks ending 29th September.

1883.			£	s.	d.	£	s.	d.
		Brought forward -	-	-	-	3,251	17	2
29th Sept.	F. Gaster -	Preparation, &c. of Weather Reports -				32	16	0
„ „	F. J. Brodie -					18	18	10
„ „	G. G. Francis -					18	4	8
„ „	A. J. Rigby -					15	0	0
„ „	R. Sargeant -					14	11	5
„ „	A. Buchan, salary - - - -		37	10	0			
„ „	„ travelling expenses - -		39	1	11			
						76	11	11
„ „	W. C. Ley, salary - - - -		-	-	-	37	10	0
„ „	Capt. H. Toynbee - - -	Discussion of observations and care of instruments.				33	6	8
„ „	Nav. Lieut. C. W. Baillie, R.N. -					20	16	8
„ „	R. Strachan - - -					27	15	6
„ „	C. Harding - - -					22	4	5
„ „	H. Harries - - -					13	6	8
„ „	W. Allingham - - -					13	6	8
„ „	W. G. James - - -					9	12	0
„ „	J. R. Jones, Aberdeen agent -		-	-	-	4	5	0
„ „	J. Fowler, Cardiff „ -		-	-	-	5	0	0
„ „	L. Allen, Dundee „ -		-	-	-	3	17	0
„ „	J. Gill, Liverpool „ -		-	-	-	17	11	10
„ „	C. H. Permain, Southampton agent -		-	-	-	1	18	9
„ „	P. Adie, repairing barometers -		-	-	-	34	15	9
„ „	C. Harding, diagrams for Barometer Manual		-	-		2	0	0
„ „	W. Allingham, copying observations for Washington		-	-		4	13	7
„ „	Williams & Norgate, books - -		-	-	-	1	14	7
„ „	J. S. Harding, junr., petty cash -		-	-	-	20	0	0
„ „	W. Allingham, collection of synchronous observations (Minutes, May 10) - -		-	-	-	2	19	1
						£3,704	14	2

116, *Victoria Street, November* 2, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (October 19) were read and confirmed.

Read—The following letter:—

M.O. 2186.

GENTLEMEN, The Observatory, Armagh, October 22, 1883.

I BEG to forward a memorial concerning the proposed abandonment of the meteorological station at this observatory, signed by some distinguished Irish men of science.

I have only to add that this observatory does not possess any funds available for meteorological purposes, and that in the event of the first class station being discontinued, and until the Government has granted the institution some compensation for the heavy losses it has recently suffered, I would be unable to undertake making such observations as the second-class stations furnish, with the regularity indispensable to such work, without a pecuniary grant from the Council.

I remain, &c.

To the Meteorological Council. (Signed J. L. E. DREYER.

M.O. 2186.

To the METEOROLOGICAL COUNCIL.

GENTLEMEN,

HAVING learned that it is intended at the end of the year to discontinue four of the seven first-class meteorological stations established in 1868, we venture to ask you to re-consider your

decision with regard to one of these, that at Armagh, in which we naturally feel more particularly interested.

It is not necessary for us to dwell on the special value of the *continuous* records as compared with a few readings of meteorological instruments taken at certain intervals, but it appears to us particularly desirable to retain a self-recording station in the north of Ireland. Having regard to the well-established fact, that the great majority of atmospheric disturbances, crossing the Atlantic, pass the parallel of Valencia far out in the ocean and reach our shores in places far north of Valencia, it will be much to be regretted if none of these should in future be traceable on the continuous records, except at Aberdeen, which station is on the east coast of Great Britain, and therefore one of the last stations reached by the storms referred to.

If ever the well-known project of a telegraphic cable to the Färoe Islands, Iceland, and Greenland is carried out, the stations at Valencia, Armagh, and Aberdeen, being almost equidistant and in a straight line, would furnish the most secure base with which the readings taken at the proposed stations on the Färoe Islands, Iceland, and Greenland could be combined, but if Armagh was discontinued the long interval between Valencia and Aberdeen could only be filled by the far less complete records of the second-class stations.

Finally, we would also call your attention to the fact, that meteorological observations have been carried on in an unbroken series at the Armagh Observatory since the year 1833, and that the anemometer designed by the late Dr. Robinson has been in action since 1846. The observatory therefore seems to have special claims to the continued support of the Meteorological Council. If the question of continuing the first-class station at Armagh were left open for the present, until the general prospects of the observatory had assumed a more definite aspect, there would be less risk of an unnecessary and irreparable break in the meteorological records at Armagh, the more so as it may be doubtful whether the observatory in its present unsettled state could be counted on, even as a second-class station, without some pecuniary support from the Council.

We remain, &c.

(Signed) ROSSE.
JOHN H. JELLETT,
Provost of Trinity College.
SAML. HAUGHTON.
GEO. FRAS. FITZGERALD.
THOS. W. GRIMSHAW,
Registrar General for Ireland.
G. JOHNSTONE STONEY.

The Council having considered the subject of the long arrears in the publication of the Quarterly Weather Reports, it was resolved that monthly summaries should in future be prepared, so as to be ready for publication before the expiration of the subsequent month, and that the necessary assistance be given in order to enable Mr. Scott to have this done. This to take effect from January 1, 1884.

Read—The following letter:—

M.O. 2190.

DEAR MR. SCOTT, Emmanuel College, October 19, 1883.

I HOPE to forward to you within a few days an account of experiments made with a view of comparing the results given by the different instruments for measuring evaporation. The instruments do not appear to be measuring the same quantity, the indications being very discordant and without any apparent law. I have thought it advisable to make some experiments on the evaporation from a free-water surface under varied conditions as to velocity and humidity of the air. For that purpose I intend to include in a large wooden box an evaporator and centrifugal blower. The centre of the blower to be supplied with air which has passed over either wet glass or glass moistened with sulphuric acid, so that the air in the box may be made to assume a steady condition of any required humidity. A number of experiments have already been made with the blower and evaporator in a large room, but the variation in the humidity was too slight to give a satisfactory series of observations, and attempts to dry or moisten the air artificially produced very little effect upon so large a space. Mr. J. H. Randell, Assistant Demonstrator at the Cavendish Laboratory, took the observations for me, and will take the observations in the small closed space which I have had fitted up.

The experiments on hygrometry are in this state at the present time: I have made myself tolerably familiar with the methods of observing all the instruments and their peculiarities. I have moreover, tested the chemical method, and thereby the efficiency of the absorbing substances used in my drying tubes, by repeating (with some slight modifications) the experiments of Regnault on the density of aqueous vapour in saturated air (Ann. de Chemie., III., Vol. XV., 1845). I find that the tension, as calculated from my weighings, agrees with the tension as deduced from the temperature of saturation of the air within a small fraction of a millimetre.

I have made a large number of comparisons of different psychrometers, with a view of ascertaining how to arrange the conditions in order that any two psychrometers shall give the same readings. I have also a few comparisons of a row of psychrometers with Alluard's instrument, Regnault's instrument, Dines' instrument, the hair hygrometer, and the chemical method. I discontinued these

Office

comparisons because I could not be certain that the air was in the same state around each instrument.

I also took the opportunity afforded by the frost in the early part of the year to make some comparisons between one psychrometer and Alluard's dew-point hygrometer.

Schwackhöfer's instrument I fitted up and worked with for some time, and was surprised to find that when tested with saturated air it gave results about 3 mm. below what was expected. I distrusted at first its oil gauge (which is very troublesome on other accounts) and replaced it by a mercury gauge, but it was no better. I then thoroughly cleaned the instrument again in every part, and tried again, but with no better success. I feared that the result was due to the imperfect absorption of the moisture by the sulphuric acid, and decided to leave the air in contact with that for much longer periods, and on doing so found that the taps leaked very slightly at the necessary pressure. I have not yet made them tight again. I am contemplating replacing the present ones by a suitable glass one.

My programme is now :—

(I.) To obtain air in a known hygrometric state by saturating it at a known temperature between 0° C. and the temperature of the air, and pass it over (1) a Regnault's hygrometer, (2.) a thermometer, and then determine the amount of moisture in it by the chemical method. This will compare the Regnault and verify the chemical method for only partly saturated air. I shall then replace the Regnault by a Dines and probably by an Alluard, although I have only at present arranged apparatus to accommodate the Regnault and Dines. By this means I shall get the dew-point instruments compared with an absolute determination, which should, I think, give some very interesting results in connexion with the hygroscopic properties of glass and other surfaces which are, I think, by no means to be neglected in such an instrument as Schwackhöfer's.

I shall, I hope, finish this series of observations this year. The apparatus is ready, waiting now only the arrival of a new balance, which has been promised me since August, and should have been here some time since.

I shall use the Schwackhöfer's to make absolute comparison with, if and as soon as I can get it to give the tension of saturated air within a tenth of a millimetre.

(II.) [In connexion with instruments of this class, I am hoping to find some one in the laboratory who will undertake for me a series of experiments on this plan: To take two specimens of the same air, dry one, and find the diminution of pressure, saturate the other with moisture and find its increase of pressure, the sum of these two differences should be the saturated tension at the temperature, and if so it will verify Dalton's law for partly saturated air and thereby fill up a gap on the experimental basis of that law, that has as yet, so far as I can discover, not been worked at.]

When the dew-point instruments have thus been settled, I propose to work off the psychrometer. I have already a long series of observations upon small details about psychrometers, such as thickness of moistening muslin, methods of moistening, distance from screen, colour of muslin, radiation, size of bulb, and various other points. I have also a large number of observations on the effect of velocity of air on psychrometers, but I am not yet satisfied as to the method I need for measuring the air velocity; I hope to arrange a more satisfactory method soon, and I hope then to put the relation between the velocity of air and the psychrometer readings on a satisfactory basis.

I have not yet done much with the hair hygrometer; it is really difficult to see what one can add to Regnault's very numerous and careful experiments, and in any case we must make experiments on a variety of such instruments. I have at present only one hair hygrometer and have used it a good many times, but of course the net result is simply that I know something about that particular specimen. The hair hygrometer has been introduced of late years in Switzerland, I believe. The form there used, the "Neuer Procenthygrometer mit Justirvorrichtung," has certain advantages claimed for it. This should, therefore, be included in any investigation of hair hygrometers.

I am anxious to get the series of experiments (II.) to be going on at the same time as those included under (I.), but I have not myself sufficient time available to carry out the two series together. I shall try to get some one else to help. Do you think, if I cannot succeed in any other way, that it would be of any use my applying to the Council for a small grant for me to offer as some sort of retaining fee for an observer?

Believe me, &c.
(Signed) W. N. Shaw.

Submitted—Letter 2287, from Mr. Cullum of Valencia, enclosing estimates for—

	£	s.	d.
Erection of workshop - - - -	13	1	0
Repairs of roof, &c. - - - -	5	2	1½
Repair of sea wall - - - -	19	10	0
Raising wall along road - - -	4	0	0
	41	13	1

Mr. Cullum stated that the repairs to the sea wall were not urgently needed.

He was authorised to spend a sum not exceeding 20*l.* on the repairs to roof, workshop and road wall.

Read—A memorandum from Captain Toynbee reporting that since the last meeting five logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. H. Ballard, log kept by Mr. H. C. Reynell.	S.S. "Durban" -	Aug. 4—Oct. 18, 1883.	Cape Town to London -	—
Capt. W. M. Bristow (the late).*	Barque "Undine"	Oct. 4—Dec. 10, 1882.	Cardiff to Ceylon - -	—
Capt. J. T. Dunbar -	S.S. "Martaban"	Feb. 4—Aug. 8, 1883.	Liverpool to Rangoon and home.	—
Capt. F. Norman -	Barque "Polestar."	Dec. 2, 1882—Feb. 26, 1883.	Liverpool to Valparaiso -	1882, p, 42.
Capt. G. Shearer -	Barque "Corona"	July 16, 1882—Oct. 1, 1883.	Australia, Bombay, and home.	1882, p. 24.

* Capt. Bristow was killed in a gale December 10, 1882, the second officer and four of the men were washed overboard at the same time.

Mr. Scott was instructed to present the Charts (O. 27) to Capt. Dunbar, (O. 32) to Capt. Ballard, and to convey the best thanks of the Council to the other observers, and to the representatives of Capt. Bristow.

Submitted—The following Report (Minutes, 1882, p. 66) :—

M.O. 2269.

REPORT on a COMPARISON of the WIND OBSERVATIONS made at HURST POINT, with those made at the NEEDLES ROCK LIGHTHOUSE, during the two years ended November 1882.

SIR,

I BEG to submit the following report on the results obtained by comparing the wind observations made at Hurst Point with those made at the Needles Rock Lighthouse during the two years ended in November 1882.

The Needles Rock Register was obtained through the courtesy of the Trinity Corporation, while the observations made at Hurst Point were those made daily by our own observer, who, however, is also the Trinity Light Keeper at Hurst Lighthouse. The comparison was made between about 700 observations for each station, and the results are given in the tables, &c. herewith.

Table I. gives the results obtained by comparing the 8 a.m. and 6 p.m. observations at Hurst with the 9 a.m. and 6 p.m. observations at the Needles.

Table II. gives the results obtained by comparing the 6 p.m. observations (only) at each station, and rejecting all those for which the wind at the Needles Rock was not blowing with the force 5 (Beaufort's scale) or more.

The agreement between the two tables is very close, both of them showing an amount of difference between the winds at these two comparatively near stations which is very striking. Thus by Table I. we see that the *mean* amount of difference between the *directions* noted at Hurst and those at the Needles varies from 2 points, when the wind at the Needles is North-westerly to 7 points when it is South-easterly, the change from the one extreme to the other being very regular and gradual.

Table II. (for which the observations are strictly synchronous, and are only those of fresh or strong winds, or gales) shows that the mean difference in the directions varies from 3 points with Westerly (S.W. to N.W.) and with North-easterly winds to 7 points with East-south-easterly winds.

These differences are very large, but a somewhat careful examination of the individual observations leads me to the conclusion that the winds observed at the Needles Rock Lighthouse (especially during a true South-south-easterly current of air) are quite as faulty as those made at Hurst Point; only at the former position the divergence from the true direction is in the opposite direction to that at the latter. Thus a true S.S.E. wind is often reported as S.S.W. at Hurst, while it is E.S.E. at the Needles.

That there is a great difference between the winds outside the Needles and those in the Solent, is confirmed by a statement made to me by my brother, who has commanded large merchant vessels and is now the Trinity Agent at Cowes, I. W. He says that when approaching the Solent from the westward, with a South-easterly wind, the Trinity Tender being braced sharp up and close-hauled he *always* finds that on passing the Needles the wind veers round and forms a good "leading wind" for the vessel to her anchorage at Cowes.

I believe that the wind observations at Hurst are almost always from two to four points wrong in direction, but matters would not be improved even if the station *could* be transferred to the Needles—the influence of the Solent being altogether too great.

With regard to the *force* of the wind, it appears that the observations made at the Needles Rock are often even stronger than those at Hurst, and yet even the Hurst forces often *appear* to be too strong.

We shall not get good observations of wind direction from any point "inside" the Isle of Wight, and if we think of the southern side of the island the high cliffs there form a serious obstacle to the force of Northerly winds.

I am, &c.
(Signed) FREDC. GASTER.

R. H. Scott, Esq., Secretary,
Meteorological Council.

The work was carried out by Mr. Rigby.

HURST CASTLE WINDS.

TABLES I. and II.:—Giving a SUMMARY of the RESULTS of the COMPARISON OF WIND OBSERVATIONS at NEEDLES ROCK LIGHTHOUSE and HURST POINT.

COMPARISON of observed WIND (Direction and Force) between NEEDLES ROCK LIGHTHOUSE and HURST POINT (November 1880 to November 1882).

TOTAL NUMBER OF OBSERVATIONS USED, 1,529.

TABLE I.

MEANS OF 8 A.M. AND 6 P.M. COMBINED.

Needles.		Hurst.		Mean Difference.	
Means.				Direction in Points.	Force in Beaufort Scale.
Direction.	Force.	Direction.	Force.		
N.	4	N.E. by N.	3	3	1
N.N.E.	4	N.E. by E.	3	3	1
N.E.	4	E. by N.	4	3	0
E.N.E.	4	E. by S.	4	3	0
E.	4	S.E.	3	4	1
E.S.E.	4	S. by E.	3	5	1
S.E.	4	S.W. by S.	3	7	1
S.S.E.	5	S.W.	5	6	0
S.	4	S.W. by W.	4	5	0
S.S.W.	5	W. by S.	4	5	1
S.W.	5	W.	5	4	0
W.S.W.	5	W. by N.	5	3	0
W.	4	N.W. by W.	4	3	0
W.N.W.	5	N.W. by N.	4	3	1
N.W.	5	N.N.W.	4	2	1
N.N.W.	4	N. by E.	3	3	1

TABLE II.

MEANS OF 6 P.M.—FORCE 5 AND ABOVE, ONLY.

Needles.		Hurst.		Mean Difference.	
Means.				Direction in Points.	Force in Beaufort Scale.
Direction.	Force.	Direction.	Force.		
N.	5	N.E.	4	4	1
N.N.E.	6	N.E. by E.	5	3	1
N.E.	6	E. by N.	6	3	0
E.N.E.	5	E.S.E.	5	4	0
E.	5	S.E. by S.	5	5	0
E.S.E.	6	S. by W.	4	7	2
S.E.	6	S.S.W,	5	6	1
S.S.E.	7	S.W.	6	6	1
S.	6	S.W. by W.	5	5	1
S.S.W.	7	W. by S.	6	5	1
S.W.	6	W.	6	4	0
W.S.W.	6	W. by N.	6	3	0
W.	6	N.W. by W.	5	3	1
W.N.W.	6	N.W. by N.	5	3	1
N.W.	5	N. by W.	4	3	1
N.N.W.	6	N.E. by N.	4	5	2

Read—Letter 1823, from Mr. Russell of Sydney Observatory, declining to undertake the continuance of the annual grant of 5*l.* made to the observer at Norfolk Island.

Resolved—That the observations be discontinued, and the instruments returned to the storekeeper, Sydney. The discussion of the observations already received to be undertaken by the Office if the materials seem good enough.

Submitted—The following reports of work from July 1st to October 31st, 1883:—

MARINE ROOM.

November 1, 1883.

Examined 67 new logs.

North Atlantic Weather Charts.

The preparation and plotting of sea and land observations for the various months have steadily progressed.

Two charts for August 1st, 1882, respectively one-third and one-fourth the scale of the working charts drawn as specimens to aid in determining the size for publication.

A sheet containing 12 reduced charts, six for barometer and wind, and six for air and sea temperatures and weather—scale $\frac{1}{4}$ of original, prepared for Council.

Sending out fresh supplies of forms to captains of ships, and acknowledging the receipt of sea and land observations.

One clerk engaged about half the time collecting observations from ships arriving in the ports of London and Liverpool.

The present state of the work is shown in a memorandum drawn up for the information of the Council, dated October 13th.

(Signed) CHAS. HARDING.
C. W. B.

The Marine Superintendent.

TELEGRAPH (Forecast and Storm Warnings) BRANCH.

Calculating Means of Daily Maximum and Minimum Temperatures at all our Telegraphic Reporting Stations for the nine years, 1872–80.—Four-fifths done.

Comparing the Wind Observations made at Hurst Point with those made at the Needles Rock Lighthouse—(Two years of observations, made twice daily at each station.)—Completed, and Report handed in.

Hay Harvest Forecasts, 1883.—Issued regularly; checking of same now in hand.

Preparing Specimen Number of Quarterly Weather Report on Weather, Forecasts, Warnings, &c. (to be issued promptly soon after close of each quarter). Just commenced.

Calculating Mean Temperature of Evaporation at 8 a.m., for all our Telegraphic Reporting Stations, during 10 years, 1871–80. About one-third done (*i.e.* no progress since last Report).

During the interval of four months the whole of the staff have taken their summer vacations, which (as mentioned in last Report) has prevented any great progress being made with any but routine work.

FREDC. GASTER.

PANTAGRAPH ROOM.

Copper Plates pantagraphed.—21 plates, Nos. 53 to 73, 1878.

Zinc Plates.—Barograms, 11 plates, Nos. 63–73, 1878; Thermograms, 11 plates, Nos. 63–73, 1878; Vapour Tension, 21 plates, Nos. 53–73, 1878; Rain Curves, 11 plates, No. 63–73, 1878; Chart Plates, 5 plates, Nos. 11–15, 1876.

The proofs of plates 37 to 73, 1876, and Nos. 1 to 47, 1878; also of chart plates 11 to 15, 1876, have been examined and checked.

The charts for the third part of the Quarterly Weather Report, 1876, have been drawn, and the tables, and remarks to accompany them partly prepared.

Tables of the average hourly frequency and amount of rainfall at the seven observatories have been recalculated, and curves drawn for each month, quarter, and year.

Tables of daily amounts of sunshine at Bunhill Row for the first nine months of the year have been prepared for the Meteorological Society.

A table of weekly amounts of sunshine at 31 stations for 1881, with cumulative totals, &c., to accompany the reduced copy of the Sunshine Records has been prepared.

The thermograms of the seven observatories for the year 1875 have been passed through the Harmonic Analyser; and the barometer constants for the year 1876 have been worked from the analyser results, and also for the purpose of comparison from Mr. Eaton's figures.

The receipt and registry of the Sunshine Records has been attended to as usual.

The usual summer vacation has been taken during the interval covered by this Report.

The engraver, Mr. Wall, was transferred to the office keeper's room on October 26th, and H. Brown was transferred to the Computing Room on September 26th.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

SIR,

THE following *Curves* and *Tabulations* have been examined:—April (1882); *Thermograms*, four stations; *Barograms*, four stations; *Anemograms*, five stations.

November (1882) to May (1883): The *Kew Barograms* and *Thermograms* for the Annual Report.

May (1883): *Barograms*, one station.

June (1883): *Thermograms*, two stations; *Barograms*, two stations.

July and August (1883): *Thermograms*, two stations; *Barograms*, two stations; *Anemograms*, two stations.

September (1883): *Thermograms*, two stations; *Barograms*, one station; *Anemograms*, one station.

The *Notes of Errors* and Monthly Report thereon for April 1882 have been written out, and some time devoted to the remarkable barometric disturbances of August 27–29th, 1883.

During the period under notice the staff have been absent on the annual vacation.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S., Secretary, Meteorological Council. (Signed) T. E. ALLEN.

Reported—That the following cheques had been drawn during the month of October:—

			£	s.	d.
6th October.		For weekly salaries	29	6	5
13th	„	„ „	29	8	11
„	„	C. E. Strachan, Arctic work (Minutes, May 10)	4	7	0
„	„	Kew Committee, verifications, &c.	22	17	10
„	„	Caretakers Bermuda anemometer	4	11	0
18th	„	Maple & Co., furniture	5	10	0
„	„	Pickford & Co., carriage of parcels	3	14	5
„	„	Steel and Jones, newspapers	1	7	0
„	„	Meteorological Society, observations	25	0	0
„	„	F. Dangerfield, delivery of charts, &c.	11	13	4
„	„	Nautical Magazine, advertisements	2	5	0
		Carried forward	£140	0	11

			£	s.	d.	£	s.	d.
		Brought forward -	-		-	140	0	11
20th October.		For weekly salaries - - -	-		-	29	8	11
27th	,,	,, ,, - - -	-		-	29	8	11
,,	,,	Gas Light and Coke Co., gas -	-		-	2	3	6
,,	,,	Stationery Office, sale of forms -	-		-	2	7	7
,,	,,	Paterson and Cooper, articles for cloud camera			-	2	14	10
,,	,,	Meteorological Society, observations -	-		-	16	13	4
,,	,,	Postmaster-General, telegrams -	-		-	170	15	4
,,	,,	T. W. Baker, inspections - -	-		-	28	10	6
,,	,,	Negretti and Zambra, instruments and repairs			-	92	7	0
31st	,,	R. H. Scott, salary - - -	-		-	66	13	4
,,	,,	J. S. Harding, jun., salary - -	-		-	27	15	6
,,	,,	T. D. Bell, salary - - -	-		-	14	8	10
,,	,,	J. E. Cullum (Valencia), salary -	-		-	16	13	4
,,	,,	R. H. Curtis -	Discussion, &c., of observations.			22	4	5
,,	,,	J. A. Curtis -				16	3	7
,,	,,	T. E. Allen -				15	11	1
,,	,,	C. H. Thompson -				11	3	4
,,	,,	H. N. Cobley -				10	5	11
,,	,,	E. G. Aldridge -				7	16	8
,,	,,	F. Gaster -	Preparation, &c. of Weather Reports.			30	17	0
,,	,,	F. J. Brodie -				19	13	0
,,	,,	G. G. Francis -				20	1	6
,,	,,	A. J. Rigby -				15	0	0
,,	,,	R. Sargeant -				13	0	3
,,	,,	Capt. H. Toynbee -	Discussion, &c. of observations and care of instruments.			33	6	8
,,	,,	Nav. Lieut. C. W. Baillie, R.N.				20	16	8
,,	,,	R. Strachan - -				27	15	6
,,	,,	C. Harding - -				22	4	5
,,	,,	H. Harries - -				13	6	8
,,	,,	W. Allingham -				13	6	8
,,	,,	W. G. James - -				9	12	0
,,	,,	J. S. Harding, jun., petty cash -	-		-	50	0	0
						£1,012	7	2

116, *Victoria Street, November* 14, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 2) were read and confirmed.

Read—The following letters :—

M.O. 2077.

British Association for the Advancement of Science,
22, Albemarle Street, London, W.,
November 8, 1883.

SIR,

I AM instructed by the Council of the British Association to forward to you, for transmission to the Meteorological Council, a copy of a report adopted by the Committee of Section A., and considered by the Council in pursuance of a resolution of the General Committee at the Southport meeting. (Minutes, p. 49.)

I am also instructed to request that the Meteorological Council will be good enough to furnish the Council of the British Association with any information bearing on the subject which they may be willing to give, so as to enable the Council of the British Association to give the matter further consideration.

I have, &c.
(Signed) T. G. BONNEY,
Secretary.

General Strachey, C.S.I.

M.O. 2392.

Royal Cornwall Polytechnic Society,
Falmouth, November 13, 1883.

SIR,

PERMIT me to thank you for your courteous letter received in August last.

Understanding that the position of the Falmouth Observatory may possibly affect the decision to which your Council are about to come with regard to its retention, I am desired by my Committee to respectfully invite some members or member of your Council, or other expert on their behalf, to inspect the building and position of the instruments ; and further, to say that in the event of their or his report being unfavourable to the site, the Royal Cornwall Polytechnic Society will enter into negotiations for erecting a new observatory in the neighbourhood, on a site and on terms to be approved by the Meteorological Council.

I am, &c.
(Signed) EDW. KITTO,
Secretary.

The Chairman, Meteorological Council.

The following Minute was adopted as the reply to the Council of the British Association, and Mr. Scott was instructed to forward copies to Professor Bonney and to the subscribers to the memorials from Falmouth, and from Armagh (Letters 2318, 2348, 2349).

The Meteorological Council, having given notice in February last of their resolution to discontinue four of the seven photographic self-recording observatories which had hitherto been maintained by them, namely, those at Falmouth, Armagh, Stonyhurst, and Glasgow, have received representations from the Royal Cornwall Polytechnic Society, which is interested in the Falmouth Observatory, and from several gentlemen who are interested in the Armagh Observatory, as well as from a Sub-Committee of Section A. of the British Association for the Advancement of Science, composed of persons eminent for their knowledge of physics or meteorology, stating their reasons for thinking it important that the observatories which it had been determined to close should be retained in operation, and requesting the Council to reconsider their resolution.

The Council, recognising the weight of the authority which has thus questioned their action on scientific grounds, have given to these representations the respectful consideration which is due to them, and having carefully reviewed their proceedings in this matter, they now purpose to record the reasons which led them to adopt the resolution the propriety of which has been questioned, and which, after a careful reconsideration of the subject, confirm them in maintaining the course they before resolved to follow.

The seven continuously self-recording observatories were established about 15 years ago, and have been in regular operation since the beginning of 1869. The Meteorological Council, which body succeeded the old Meteorological Committee in 1877, was constituted on the Report of a Treasury Committee, which must be regarded as defining generally the scope of the operations of the Council, and the objects to which the public funds granted by Parliament and placed under their control should be applied.

It became one of the first duties of the Council to review the system under which the work of the Meteorological Office was carried on, and among the questions which thus came under consideration was that of the extent to which the funds at the disposal of the Council should continue to be applied to the maintenance of the self-recording observatories, the direct cost of which was very considerable, besides requiring a large share of the time of the Office in the preparation of the observations for publication, which in itself also was a serious cause of further expense.

The necessity for this reconsideration had indeed been indicated in the Report of the Treasury Committee, which, referring to the self-recording observatories, remarked as follows:—"It may "deserve consideration by the Council whether some, at any rate, of the existing stations may not "be discontinued, and others obtained in more eligible sites. Doubts have also been expressed "whether, in the present state of meteorological science, the minute exactness of the observations "now taken at these stations is of sufficient comparative value to justify the whole of the costs "which they involve, when there are so many other objects of meteorological inquiry which call "for increased expenditure."

To show the serious practical importance of this question in its financial aspect, it will suffice to state that the cost of these observatories since their opening in 1867 till April 1882, including the charges for the reduction of the observations, and their preparation for publication, so far as this has been carried out, had amounted to no less than 52,782*l.*, besides the cost of publication and printing. Moreover, as the instruments have now been in use for so long a time, some of them require renewal, which will entail a considerable outlay.

Under the continually increasing pressure to add to the efficiency of other branches of the work of the Office, the Council was led to discuss from time to time the question of how best to deal with these observatories, and the decision first come to was that no change should be made at all events until the full cycle of 11 years had been completed. Early in 1882 the Council considered that the time had arrived when a final decision could no longer be properly delayed, and, subject to the result of further inquiries which they desired to make of eminent foreign meteorologists, they came to the conclusion that the retention of the whole number of seven self-recording observatories need not be continued after the end of 1883, which somewhat distant date was named to admit of reasonable notice being given to the observatories which might be discontinued.

The opinions specially asked for were those of Dr. Hann, the director of the Vienna Meteorological Observatory, of Dr. Wild, the head of the Meteorological Service in Russia, and of Mr. H. S. Eaton, a past President of the Meteorological Society of London. The well-known eminence of the two former gentlemen and their long practical experience as directors of large meteorological systems of observation, as well as their obvious freedom from all possible local prejudice, induced the Council to select them and to attach great weight to their opinions, which are therefore annexed in extenso. The opinion of the other gentleman consulted was quite to the same effect.

The late Chairman of the Council, Professor H. Smith, on the 16th May 1882, addressed the following letter of inquiry to the persons thus consulted:—

"As you are no doubt aware, a system of seven self-recording observatories has been now maintained by the Meteorological Office for more than 14 years; and the opinion has been expressed by some meteorologists of eminence that the time has arrived when this system should be revised, with a view to a considerable diminution in the number of the observatories.

"I venture to ask you as a great favour, to communicate to me any opinion which you may be led to form as to the question thus raised.

"The funds annually placed at the disposal of the Meteorological Council by Her Majesty's Government are strictly limited in amount; on the other hand, the Council is allowed considerable latitude in the appropriation of their annual grant.

"Under these circumstances the question of the continued maintenance of the observatories presents itself to the Council, as turning, not on the desirability in itself of the continuance of the present system, but on the importance of that object as compared with other branches of meteorological work.

"If any of the observatories were suppressed, the funds thus liberated would not be lost to meteorology, but would be applied to other purposes of recognised importance, such as—

"(1.) The more complete discussion of the continuous records already obtained;

"(2.) Extensions of the existing arrangements for the synoptic study of weather;

"(3.) Experimental researches on the physical problems of meteorology; or

"(4.) The more complete equipment of such of the observatories as might be retained.

"And it is felt by the Council that the cost of the seven observatories encroaches perhaps unduly on the funds which would be available for these or similar purposes.

"It has been suggested that the number of observatories might be reduced to three; one at Kew, one at Valencia, one at Aberdeen, or some place in the north of Scotland; these three points forming a nearly equilateral triangle which covers a great part of the United Kingdom.

"I shall be greatly obliged to you if you could inform me whether, in your opinion, three self-recording observatories, supported of course by stations of the second order, would be sufficient to furnish an adequate continuous record of the climate of the British Isles; and if you should think the number three insufficient, whether any smaller number than seven would, in your judgment, suffice."

Dr. Hann wrote in reply as follows:—

"I think that three observatories of the first order, Valencia, Kew, and a third in the north of Scotland, ought to suffice for permanent service. The materials which have already accumulated

from the seven observatories should certainly suffice for the investigation of the daily march of the principal elements of meteorology.

" If I were in the place of the Meteorological Council and had to decide this point I should certainly, in view of the great expense of seven observatories, preserve only three, one in each kingdom, and abolish four of them, as soon as they had yielded material enough to solve the problems of local climatology.

" I should, however, maintain these points as stations of the second order, for observations to be made two or three times daily, if there do not exist in their vicinity stations of that class in similar situations.

" Eventually, if funds were readily available, I should erect at each of the seven observatories simple mechanical barographs (Höttinger's or Kreil's, at a cost of about 20*l.*), in order to trace the progress of barometrical waves in special cases, and should also leave the anemometers in action. I should not, however, reduce the records fully, but simply use them to trace easily the history of storms and squalls, in short to facilitate the study of extraordinary atmospherical phenomena.

" The apparatus mentioned does not require further attention than the insertion of, and the dating of, the papers, so that the cost of maintenance could not be high.

" I should not continue the records of temperature or humidity, but should possibly keep up that of rain, if that is mechanical and does not involve much expense or trouble.

" I am at present gradually establishing at various points in the Austrian Empire the very simple barographs of Höttinger (Zürich) which are very convenient, and not only enable us to trace the progress of barometrical minima, but lead to the easy detection of errors in reading the mercurial barometer at the regular hours of observation.

" I fully approve of the proposal that the funds set free by the suppression of four of the observatories should be primarily devoted to the complete discussion and reduction of the material already accumulated from the entire seven, and secondarily to meteorological investigations of the modern type (*zeitgemäss*) and with a different object such as synoptic studies [with the help of mean values for long periods, on the basis of monthly means] embracing large areas of the earth's surface—problems of physical meteorology—the establishment of stations of the second order at points where they would be desirable for synoptic work or for the investigation of special local peculiarities of climate."

Dr. Wild said :—

" The question of the possible reduction of the number of the automatic observatories in the British Isles is in its nature of such importance to the science of meteorology in general, that I have felt much difficulty in answering it.

" It would of course be in itself desirable for the investigation of the climate of a country to maintain as many stations in it provided with self-recording instruments as is possible. Unfortunately, however, the funds available for meteorological inquiry are, in almost all cases, so limited that they will only suffice to meet a certain proportion of the demands made on them. Under these circumstances, therefore, we must from time to time devote our energies to such inquiries and discussions as appear the most urgent and important for the progress of the science at the time.

" If from this point of view we consider the number of automatic observatories whose maintenance in a country is necessary, we shall certainly be led to recommend that this number should be limited in comparison with what may be deemed desirable.

" Almost without exception, the only scientific use which has been made of these frequent or continuous observations has been to deduce the diurnal range of each element, and thence to determine the corrections applicable to the observations taken at regular intervals, in order to obtain true daily means. Nay more, in view of the very small number of such stations in most countries it would be impossible to utilize their observations in any other direction.

" The disproportionate expense which the maintenance of such stations involves appears to me, in consideration of the impossibility of discussing their results in all directions, to indicate the necessity of reducing their number to such an extent as to render it possible to carry out the speedy and complete discussion of their records in the way above indicated.

" As to the United Kingdom in particular, I am of opinion that, as the seven observatories have been at work for 14 years, they have yielded material sufficient to exhibit the diurnal range of the principal elements for all parts of the British Isles, and that the time has come for reducing them to about three, so as to set free funds for the discussion of the records collected, and for the treatment of other important subjects in our science. Three such observatories in your country ought to be enough to enable you to trace extraordinary phenomena in the same detail as is done elsewhere and to complete the materials for the study of diurnal range."

After the receipt of these opinions the Council, before finally settling which of the stations, if any, should be given up and which should be retained, had many administrative points to consider. The retention of Kew was essential in connexion with the necessary provision of the means of verifying and testing new instruments and methods of observation. Valencia, though the most costly, is also obviously the most important of the stations, in respect to all questions relating to the study and forecasting of the weather. Aberdeen, occupying a position nearly at the apex of an equilateral triangle of which Kew and Valencia formed the base, appeared to be the best practicable locality for a station in the north of the British Isles, a preference which was sustained by its position on the east coast, well exposed to the north. Some hesitation was felt as to Falmouth on account of its undeniably good geographical position; but the confined site of the observatory was held to be so unfavourable for the correct record of the temperature, humidity, and wind of the

Office

adjacent district, as to lead the Council to think that it should not have a place among the observatories to be retained in their present complete and costly form. With reference to this last point, on which the Inspectors of the Office have always insisted, the evidence of Dr. Mann (then recently President of the Meteorological Society) before the Treasury Committee may further be cited. He said:—"At Falmouth the observatory stands upon an accidentally selected spot, where a small "street occupies the uniting line between two high ridges in a *cul de sac*. The temperature "observations taken there are not comparable, certainly with those of observatories that are more "fairly placed."

". . . . (*Chairman.*) Do I understand you that the observatory at Falmouth is so placed as to "be under very peculiar meteorological conditions?—Yes, under local conditions which do not "give good general results."*

The Meteorological Council never had any doubt of the general importance of maintaining continuous records of the meteorological elements at several stations in the British Isles, and on this point they are quite in accord with the Sub-Committee of the British Association. The difference of opinion which exists arises from a different estimate of the relative importance of the various branches of the duties which have to be discharged by the Council, and of what will be the most effective distribution of the grant placed at its disposal, which, though on a liberal scale, is yet limited in amount, and an increase to which they could not suggest with any prospect of success without far stronger reasons than, in their opinion, could be based on the scientific urgency of maintenance of the observatories in question.

The Council, being thus constrained to regard the matter at issue as one which must be looked at in its financial, no less than in its scientific bearing, cannot avoid the conclusion that those who have so strongly urged the continued maintenance of the seven self-recording observatories have no adequate knowledge of the very large area over which the operations of the Meteorological Office extend, of the many subjects to which attention has to be given in the study of the meteorology not only of the land but also of the sea, and of the multiplied and increasing demands made upon it in other directions than those that have been pressed upon it in the memorials now under consideration. The objections made to the decision of the Council are not accompanied by any reference to these other demands which cannot at present be met for want of funds, nor have these been weighed one with another, neither does it seem to have been considered whether much at least of what is desired might not be secured as well and more economically under a modified system.

It is the belief of the Council that all that is really required in the interests of science can be obtained under the arrangements they have in view, and which they propose to carry out when the funds set free by the reduction in the number of observatories are available.

So far as the ordinary meteorological constants for the seven observatories are concerned, the Council feel confident that these may be obtained with all the accuracy required for present scientific needs from the records already accumulated and published or in course of publication, extending over not less than 13 years. They also consider that the maintenance of the observatories which they have decided to retain, viewed in connexion with the records of other similar institutions in this and other countries, will give ample means of studying any periodical variation of long period, such as the 19 years cycle which has been specially alluded to; although it is certain, from discussions which have already been undertaken, that such variations must be extremely small, so that it is doubtful whether their existence can be established, and difficult to believe that they would be found to be of any practical importance either in respect to climate or changes of weather,—the two branches of meteorology with which the public is most concerned.

It remains for the Council to explain the arrangements which they design to carry out, as soon and as far as practicable, as funds become available, with a view to removing recognised deficiencies in their present arrangements. These will chiefly consist in an increase in the number of the telegraphic reporting stations with an improvement in their equipment, and additions to the staff of the Office, in the following manner:—

1. By supplying many of the stations with inexpensive continuously recording mechanical barographs, to be employed as differential instruments, controlled by frequent readings of the ordinary mercurial barometer. These would be fully adequate to show the passage of barometric fluctuations, and of ensuring that no sudden event should pass unnoticed, while the progressive changes of pressure they indicated could be communicated by telegraph by aid of a special code of signals. A similar system of recording temperature could be extended to some selected stations.

2. By establishing self-recording anemometers in properly exposed situations, possibly connected electrically with the telegraph stations, which being usually in towns and sheltered from winds, are generally ill-suited for observations of wind direction and force.

3. By making arrangements for more systematic observations at or near telegraphic stations of the upper aërial currents, as indicated by the movements of clouds, and especially cirrus.

4. By establishing, when funds become available, a night service at the Office, by which forecasts of weather based on observations made as late as 11 p.m. might be issued in time for publication in the newspapers in London and principal towns in the country. The morning forecasts are now based on observations made at 6 p.m. of the previous evening, and 14 hours out of the 24 to which they relate have therefore elapsed before they can be read.

5. By providing additional scientific staff in the Office, the time of its present establishment being absorbed by routine duties. A more thorough and continuous watch over the system of forecasts and the actual weather ensuing is requisite, as well as increased attention to the early discussion of the observations, and closer supervision of the experiments and trials of new instruments.

* Report of the Treasury Committee appointed to inquire into the conditions and mode of administration of the annual grant in aid of meteorological observations. [C.—1638.], 1877, page 88.

By these measures, which will greatly increase the number of self-recording stations, it is believed that most of the objects held to be important by meteorologists will be better met than by the necessarily limited operation of the self-recording observatories which would be given up, whose efficacy in assisting the preparation of forecasts of weather is extremely small. The superior accuracy of the observations made at the existing observatories hardly extends beyond those of the dry and wet bulb thermometers, and the proposed greatly increased number of the stations at which continuous observations of pressure and wind would be recorded would more than compensate for such advantages as might otherwise be lost by the change.

The Council have no hesitation, on this review of their position, in recording their opinion that the objects which they have thus enumerated will, to say the least of it, require all the funds that can be saved by a reduction in the number of the observatories, and that these objects are of a nature to claim precedence over the continued register of the barometer and wet and dry bulb thermometers on the refined and costly system of the photographic self-recording observatories.

In conclusion, the Council would express their hope that local efforts may, in some cases at least, be forthcoming to maintain the observatories which they cannot, consistently with other demands on them, continue to support, and they are prepared to make moderate grants for a limited time for these observatories, to continue them in operation until such arrangements could be matured, and to place the instruments at the disposal of the body which undertakes to make use of them. As regards Falmouth, it would be the wish of the Council to secure a first-class self-recording observatory there or in the neighbourhood, provided that a thoroughly satisfactory site could be obtained, and if the cost of maintenance was not too great. Failing this, they would, as already stated to the Royal Cornwall Polytechnic Society, co-operate in the maintenance of a second-class observatory at the Land's End in connexion with the telegraph station, and they will now be prepared to co-operate in maintaining the barograph alone at the present station at Falmouth.

Mr. Scott was further instructed to inform the authorities of the Royal Cornwall Polytechnic Society that the Council would be prepared to consider any proposal made by them for the erection of a new observatory (Letter 2392).

Submitted—The following report:—

M.O. 2377,

SIR, Port Stewart, Coleraine, November 7, 1883.

I HAVE the honour to report, for the information of the Meteorological Council, that I visited Malin Head on the 25th October, and inspected the neighbourhood as to its fitness for a daily weather reporting station, and will give the result under the three following heads:—

(*a.*) As to the probability of getting a telegram to London in time for the Daily Weather Report.

(*b.*) As to its suitability for getting reliable observations of the direction and force of wind and sea.

(*c.*) As to the possibility of finding a suitable person to record the observations, and send the telegrams to the Meteorological Office.

(*a.*) "As to telegraphic communication."

At the present time there is no telegraph station nearer than Malin Town, which is at least two hours by messenger and car from Malin Tower, where Lloyd's propose to establish their signal station, so that *at present* it is quite unfit for a daily weather reporting station, but I learnt from Mr. T. O'Doherty, Lloyd's Agent at Malin Head, that Lloyd's have given him instructions to have the Tower repaired, and to construct a residence for a signalman. Also, that Lloyd's have an understanding with the post office to carry on the wire from Malin Town to Malin Tower. When this is completed the telegraphic communication will be perfect.

I could not get any reliable information as to *when* these changes will be completed, but no doubt this can be obtained from the Secretary to Lloyd's.

(*b.*) "As to its suitability for getting reliable observations."

The position of the tower is remarkably good; its base is 226 feet above the sea, and all high land is so distant that there is no object which subtends an angle of more than two degrees above its horizon. To give a graphic idea of the position with reference to the surounding hills, I beg to hand in the accompanying plan, drawn up by my friend J. P. Walker, Esq., C.E., who gave me the pleasure of his company.

The bearings were obtained by a prismatic compass, and the distances are from the Ordnance Survey, with which, as would be expected, the bearings agree. Malin Tower is 18 feet square and about 33 feet high; its sides face nearly N.E., S.E., S.W., and N.W. true.

The coastguard station is a mile and seven-eighths from the tower on a S.E. by E. true bearing. A very fair report might be made there, though not so good as from the Tower, and the message would have to be sent up a steep hill, supposing that the telegraph wire is carried to the Tower. The coastguard station is about an hour and a half by car from Malin Town telegraph station.

(*c.*) "As to the possibility of finding a suitable observer."

Unfortunately Mr. James Reilly, signalman to Lloyd's, to whom the Secretary to Lloyd's referred me for information, had been transferred to Deal before my visit, and his successor had not arrived. Mr. Reilly had communicated with me by letter, and was evidently an intelligent man; I heard that he had been in the army.

I think any man capable of managing the signalling and reporting for Lloyd's could soon be trained to observe and forward the Daily Weather Report. This can, of course, be settled with the Secretary to Lloyd's.

I am, &c.
(Signed) HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Office.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting seven logs had been received, six of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. T. Alderton -	S.S. "Australia"	Feb. 4—July 24, 1883.	Sydney to home and also London to lat. 11° S., long. 93° E.	—
Capt. Charles F. Cooke.	"The Lord Warden."	March 12—Oct. 28, 1883.	Melbourne and home -	—
Capt. W. Ellery -	"Majestic" -	Dec. 24, 1882—Sept. 16, 1883.	San Francisco and home	1882, p. 41.
Capt. M. Parry -	Barque "Queen of Cambria."	Nov. 12, 1882—Oct. 19, 1883.	Port Chalmers, Antofagasta, and home.	1882, p. 42.
Capt. R. Strang -	"Lyttelton" -	April 3—Nov. 4, 1883.	Otago and home -	—
Capt. E. M. Williams	Barque "Burdwan."	Dec. 12, 1882—Nov. 1, 1883.	Anjer and home - -	—

Mr. Scott was instructed to present the Charts (O. 27) to Captains Alderton, Cooke, Strang, and Williams, and to convey the best thanks of the Council to the other observers.

Submitted the following publications:—
Quarterly Weather Report, 1876, Part II.
Meteorological Atlas of the British Isles.

116, *Victoria Street, November* 29, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 14) were read and confirmed.

Read—The following letter:—

(M.O. 2470.)

British Association for the Advancement of Science,
22, Albemarle Street, London, W.,
November 22, 1883.

SIR,

I BEG leave to acknowledge the receipt of your letter dated November 19, together with the copies of the Minute of the Meteorological Council relating to the suppression of some of the self-recording observatories, and to thank you for the same.

These documents were laid before the Council of the British Association at their meeting on November 20, and will be further considered at their next meeting.

I am, &c.
(Signed) T. G. BONNEY,
Secretary.

R. H. Scott, Esq., F.R.S.

Read—The following letter:—

(M.O. 2468.)

Royal Cornwall Polytechnic Society,
Falmouth, November 22, 1883.

SIR,

I BEG to acknowledge the receipt of your letters of the 16th and 20th instant, the latter enclosing copies of the official Minute of the Meteorological Council dated the 14th November.

I am instructed to send you a copy of a resolution which was passed at a meeting of the General Committee of the Royal Cornwall Polytechnic Society held yesterday, which I annex.

I am further desired to ask you to be good enough to obtain the authority of the Council for the maintenance of the Falmouth Observatory as at present constituted from the 1st of January 1884, until an arrangement is made in reference to a new observatory. It is obvious than until such an authority be given we cannot satisfy our staff that they will be kept on, and it is only fair that they should be in a position, if necessary, to seek new employment elsewhere, and my Committee will therefore esteem it a favour to receive an immediate reply.

I am, &c.
(Signed) EDW. KITTO,
Secretary.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Council.

COPY of RESOLUTION.

Unanimously resolved:—

"That the Committee of the Royal Cornwall Polytechnic Society invite the Meteorological Council to select a satisfactory site in the neighbourhood of Falmouth, when the Society will immediately take steps to open negotiations for the erection of a new observatory, the present observatory to be carried on under the same conditions as at present, until the new one is in working order."

Mr. Scott reported that, by the Chairman's instructions, he had written a letter (P. C. 2385) inviting the Society to send "some gentleman authorised to speak in the name "of its Council" to the Office before the present meeting.

Mr. Galton stated that he had by appointment seen Messrs. Howard and Robert Fox at the Office, and had learnt from them that the Royal Cornwall Polytechnic Society were prepared to erect, at their own expense, an observatory on a site to be approved by the Meteorological Council, provided a sufficiently long continuance of the grant be guaranteed, and that its amount be not less than 300*l.* a year.

The Council adopted the following resolution, a copy of which was handed to the Messrs. Fox, who were in attendance:—

The Council are not prepared to increase the grant for an observatory at Falmouth beyond 250*l.*, the sum now allowed, but would continue this grant for the same work that is done at present, but only on the understanding that a new observatory is built to enable the records to be made under thoroughly satisfactory conditions.

In addition to this the Council would supply and erect the necessary instruments.

The constitution of the Meteorological Council prevents their giving any positive pledge as to the continuance of a grant for the maintenance of the observatory, as this would bind their successors, which they cannot do; but the present Council will, so far as lies in their power, continue the grant for at least five years, on the understanding that on two years' previous notice the arrangement may be put an end to, or modified on the expiry of that term, or at any subsequent date.

Further, it must be understood that the grant must in all cases be contingent on the requisite funds being voted by Parliament, and subject to the controlling power of the Treasury.

If an arrangement on this basis is come to before the end of the year, the Meteorological Council will continue their present grant for the existing observatory for such reasonable time as will admit of the erection of the new building.

Mr. Scott was instructed to forward a copy of the Resolution to the Society (P.C. 2472).

Read—The following letter:—

(M.O. 2508.) The Observatory, Armagh,
November 27, 1883.

SIR,

I BEG to acknowledge the receipt of your letter of the 20th instant, informing me that the Council maintain their decision to close the self-recording station attached to the Armagh Observatory.

I have to call your attention to the fact that I have not received any answer to that part of my letter of the 22nd October, in which I stated that this observatory does not at present possess any funds available for meteorological purposes. I shall therefore be glad to know whether it is the wish of the Council to have any observations taken here in future, and, if so, whether they are prepared to place a moderate grant at my disposal for this purpose.

I am, &c.

The Secretary, Meteorological Office. (Signed) J. L. E. DREYER.

Resolved—That a grant be made to Armagh Observatory at the rate of 50*l.* yearly for eye-observations, the same as those taken at a station of the second order, but including also the maintenance of the anemograph, automatic rain gauge, and sunshine recorder, and also of a mechanically registering barograph and thermograph, if the Council should decide to supply them. The grant to be subject to reconsideration when the pending proposal as to a Treasury grant to the observatory is disposed of. Copies of the registers to be sent regularly to the Meteorological Office (P.C. 2443).

Read—A letter from Mr. Call, assistant at Armagh Observatory, applying for compensation in consequence of abolition of office, if further employment cannot be provided for him (Letter 643).

Resolved—That a gratuity of 75*l.* be given to Mr. Call, with an expression of regret that the Council have no employment to offer him (P.C. 2433).

Read—The following letter:—

(M.O. 2469.) The Observatory, Glasgow,
November 21, 1883.

DEAR SIR,

I HAVE received your letter of the 20th inst. with the accompanying copy of Minute forwarded by order of the Meteorological Council. May I request you to convey to the Council my respectful acknowledgment of their courtesy in supplying me with this document, and more especially my grateful appreciation of the resolution contained in the last paragraph thereof, of which I may not improbably be induced to take advantage?

Yours, &c.

Robert H. Scott, Esq. (Signed) R. GRANT.

Read—The following letters:—

(M.O. 2408.) Scottish Meteorological Society,
122, George Street, Edinburgh,
November 16, 1883.

SIR,

WITH reference to your letter of February 17, 1879, communicating a resolution of the Meteorological Council that they are willing to contribute 100*l.* a year towards the annual expenses of an observatory on Ben Nevis, provided funds can be obtained for the erection of the building, and that copies of the observations be regularly communicated to the Meteorological Office, I am instructed by the directors of the observatory to inform you that the building has now been erected, that a superintendent and two assistants are in residence at the observatory, and that hourly observations will be commenced in a few days.

I enclose copies of the three forms (A., B., and C.)* which have been prepared for the observations. Copies of the daily observations detailed at length on Form B. will be forwarded to the Meteorological Office regularly as they are received in this office from the observatory.

I am, &c.

R. H Scott, Esq., (Signed) ALEXANDER BUCHAN.
Secretary, Meteorological Council.

* A., Hourly Forms; B., Daily Forms; C., Monthly Forms.

(M.O. 2409.)

Scottish Meteorological Society,
122, George Street, Edinburgh,
November 16, 1883.

SIR,

I AM instructed by the directors of the Ben Nevis Observatory to inform you that in connexion with the hourly observations which will commence to be made there in a few days, they have arranged with Mr. Colin Livingstone, observer of the Scottish Meteorological Society, for daily observations to be made at Fort William at 8 and 9 a.m. and 2, 6, 9, and 10 p.m.; and that, in addition to these eye observations, a Redier's Barograph and a Richards' Thermograph have been ordered both for the observatory and also for Mr. Livingstone.

If the Meteorological Council desire the observations at any of these hours sent by telegraph to their office, the Directors will give instructions to Mr. Omond, Superintendent of the Observatory. and to Mr. Livingstone, to forward regularly the information required; and I am further to say that the Directors will have much pleasure, so far as may be in their power, in obtaining through their observers any additional information the Meteorological Office may from time to time require.

I am, &c.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

(Signed) ALEXANDER BUCHAN,
Secretary.

Mr. Scott was instructed to say that the grant of 100*l.* would be made for 1883, and continued as arranged. He was instructed to ask for monthly copies of the observations, and, for the present, for occasional telegrams, at the discretion of the observer, whenever remarkable phenomena or sudden changes of weather occurred (P.C. 2453).

Mr. Scott was instructed to thank Mr. J. P. Walker for the map which he had been kind enough to draw for the illustration of Captain Toynbee's Report (Minutes, November 14).

Read Letter 2464 from Mrs. Ley, stating that her husband was prevented by illness from completing his inspections this winter. Mr. Scott was authorised to make arrangements as necessary.

The draft Barometer Manual for Seamen (Minutes, p. 45) was considered.

Read—A memorandum from Captain Toynbee reporting that since the last meeting five logs had been received, three of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. F. Milne -	S.S. "Esquimaux"	Feb. 2—Oct. 20, 1883.	Sealing and whaling in the Arctic Regions.	—
Capt. M. Nicholson	"Simla" -	Sept. 10, 1882—Nov. 20, 1883.	Melbourne, Bombay, and home.	1881, p. 18.
Capt. W. J. Wharton, R.N.	H.M.S. "Sylvia"	May 12—Sept. 12, 1883.	Surveying the Rio de la Plata.	1883, p. 55.

Mr. Scott was instructed to present the the Charts (O. 27) to Captain Milne, and to convey the best thanks of the Council to the other observers.

Read a letter (No. 2442) from the Trinity House, stating that the Elder Brethren would be ready to allow the hand anemometers to be tested, as proposed (Minutes, p. 45).

Resolved—That a grant of 10*l.* 10*s.* be made to Mr. Shaw for assistance in his hygrometrical investigation (P.C. 2288).

The following estimates were accepted :—

	£	s.	d.
Bond & Son, bookcases, etc. - - - -	18	16	6
Mr. Hicks, 50 thermometer screens - - -	12	14	2
Messrs. Negretti & Zambra, 200 thermometers - -	70	0	0

Reported—That Mr. Wall had taken up the duties of office-keeper from October 29, and that from that date the salary of Mr. J. T. Williams had been fixed at 18*s.* per week (Minutes, p. 59).

116, *Victoria Street, December* 12, 1883.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 29) were read and confirmed.

Submitted—The following correspondence (Minutes, p. 45) :—

DEAR MR. TREVELYAN, Meteorological Office, July 14, 1883.

IN compliance with the desire you expressed a few days ago, I now send, for your consideration, a statement of the matter about which I spoke.

The Meteorological Council (of which I have become Chairman) are desirous of improving the system of telegraphic reports of weather which they now receive from various parts of the United Kingdom. The most important stations for supplying information on which to found our weather forecasts are those on the west coast of the British Isles. To complete these on a satisfactory basis we are specially desirous of adding another on the west coast of Ireland. But besides the difficulty of finding a suitable locality, we meet the no less serious obstacle of there being no telegraphic wires over much of the coast.

It therefore occurred to me to ask whether the Irish Government could give us any assistance in such a matter, or suggest any way in which we might be likely to obtain what we required from the telegraphic department. A station in the vicinity of Belmullet would be very well placed for our purposes, subject to certain precautions as to avoiding localities protected from the prevailing winds, and possibly it might be in your power to support a proposal to establish a telegraphic line to some point on the coast in that quarter.

Should this be practicable we should wish to have the opportunity of saying more exactly what precise point would be most suitable for our purposes, before any final decision was come to, and we would do what was necessary in making search for such a place immediately we heard that there might be a prospect of the Post Office entertaining the proposal.

I may add that we pay for our telegrams, and that the probable contribution from such a station as I have spoken of would be not less than 20*l.* or 30*l.* yearly, and might be more.

Yours, &c.
(Signed) R. STRACHEY
Chairman of the Meteorological Council.

The Right Hon. G. O. Trevelyan, M.P.,
Chief Secretary for Ireland.

(M.O. 1622.)

SIR, Dublin Castle, July 24, 1883.

I HAVE to acknowledge the receipt of your letter of the 14th instant to Mr. Trevelyan, which has been forwarded to me by the Chief Secretary, in which you express the desire of the Meteorological Council that a telegraph station should be formed in the vicinity of Belmullet, in order that the Council should be able to receive telegraphic reports of weather from that district on the west coast of Ireland, and thus improve the system of reports which they now receive from various parts of the United Kingdom; and I beg to say that I will submit the same to his Excellency the Lord Lieutenant, and will shortly communicate with you further on the subject.

I am, &c.
(Signed) R. G. C. HAMILTON.

Lieut.-Gen. Strachey,
Meteorological Office.

(M.O. 1659.)

SIR, Dublin Castle, July 28, 1883.

WITH reference to your letter of the 14th instant, I am directed by the Lords Justices to acquaint you that the Irish Government have in contemplation the extension of the telegraph to Belmullet.

There is reason to believe, however, that the opening of an office in that locality will result in loss to the revenue, and the Post Office has declined to open an office there except under guarantee, as the extension would not be justifiable as part of the Post Office Service.

The amount required to be annually guaranteed is estimated by the Postmaster General at 306*l.*, but owing to the poverty of the district, and the absence of resident gentry, there is little or no prospect of getting any portion of the guarantee from the locality itself.

I beg therefore to request that you will be so good as to acquaint me, for their Excellencies' information, whether a station at Belmullet would meet the requirements of the Meteorological Department, and if so, what amount of annual guarantee would they be prepared to offer.

I am, &c.
(Signed) R. G. C. HAMILTON.

The Chairman, Meteorological Office.

(M.O. 1659.)

SIR, Meteorological Office, July 31, 1883.

I HAVE to acknowledge the receipt of your letter dated the 28th inst., which shall be brought before the Council at their next meeting in October, when you will hear again upon the subject. Meanwhile I may state that inquiry is being made as to the suitability of the station.

In the event of Belmullet being selected as a station, we should require two, perhaps three, messages daily at 1*s.* per message.

Yours, &c.
(Signed) HENRY TOYNBEE,
For Secretary.

R. G. C. Hamilton, Esq.,
Chief Secretary's Office,
Dublin Castle.

27121. (M.O. 2557.)

SIR, Dublin Castle, December 4, 1883.

WITH reference to your letter of the 31st July last, No. 1659, on the subject of the establishment of a telegraphic station at Belmullet, I am directed by the Lord Lieutenant to acquaint you that the post office in that town was opened for the transaction of telegraphic business on the 28th ultimo, and I am to state that, as the Estimates for the year 1884–5 are now being framed, it is very desirable to know what amount the Meteorological Society will guarantee for that year towards the expenses of keeping the office open.

I am, &c.
(Signed) W. S. B. KAYE.

The Secretary, Meteorological Office.

The Secretary was instructed to send the following reply :—

(M.O. 2557.)

SIR, Meteorological Office, December 12, 1883.

IN reply to your letter of the 4th instant (No. 27121), inquiring what sum the Meteorological Council would guarantee towards the expense of the telegraph station at Belmullet I am directed to inform you that there seems to have been some misconception as to the intentions of the Council.

In the letter of the Chairman to Mr. Trevelyan, which explained the wishes of the Council, it was stated that the Council desired to establish a station on the north-west coast of Ireland, and that, if it were rendered possible by opening telegraph communication to a suitable place, they would desire to avail themselves of the telegraph to the extent of sending one or two messages daily when their station was established.

The Council have not yet been able to arrange for this, but when they have succeeded, which they hope to be able to do before long, the payments which they contemplated will be forthcoming, but they are unable to offer any specific guarantee, and it was never intended by them to make any such offer.

I may add that the payment for one message daily at present rates would be about 18*l.* a year, and the Meteorological Office would probably require two or three messages daily.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

W. S. B. Kaye, Esq., Q.C., LL.D.,
Assistant Under Secretary,
Chief Secretary's Office, Dublin Caste.

Read—The following letter (Minutes, p. 76) :—

(M.O. 2468.)

SIR, Royal Cornwall Polytechnic Society,
Falmouth, December 8, 1883.

I AM in receipt of your letter of the 6th instant, and am requested by my Committee to state, in reply, that the Royal Cornwall Polytechnic Society are prepared to accept the conditions under which the Meteorological Council will continue to them the grant of 250*l.* per annum for the maintenance of an observatory at Falmouth ; and further, that my Committee will be glad to see you down to inspect the available sites at your earliest convenience.

If you can give a day or two's notice of your coming, it will enable my Committee to make the necessary arrangements for the inspection.

I am, &c.
(Signed) EDWD. KITTO,
Secretary.

R. H. .Scott, Esq., M.A.. F.R.S.,
Secretary to Meteorological Council.

The Secretary was instructed to visit Falmouth at once.

Read—The following letter :—

(M.O. 2600.)

DEAR SIR, Midland Hotel, St. Pancras,
December 10, 1883.

IT appears to me that it might be opportune, before returning to Glasgow, to submit to the Meteorological Council the views of the Committee appointed by the Senate of the University of Glasgow to consider the best course to be adopted in connexion with the proposed discontinuance of the meteorological operations heretofore conducted at the Glasgow Observatory under the direction and at the expense of the Meteorological Council.

Office

The Committee are unanimously of opinion that, whether viewed in relation to the advancement of meteorological science, or on grounds of public usefulness, it would be most undesirable that the operations with the self-recording instruments should be brought to a close. The Committee accordingly decided upon making an appeal to the Town Council and some of the other public authorities of the city of Glasgow, with the view of setting forth the importance of the meteorological operations at the observatory, and obtaining their support towards raising a fund, the annual proceeds of which might be appropriated towards the permanent maintenance of a system of such operations. Various causes have contributed to retard the action of the Committee in this matter, but they are inclined to believe that the community of Glasgow will eventually come to their aid. Under these circumstances I am authorised by the Committee to request respectfully of the Meteorological Council that they would continue for another year the annual grant allowed for the prosecution of meteorological operations at the Glasgow Observatory.

In the meantime they beg to assure the Meteorological Council that during the forthcoming year every effort will be used to provide a state of matters which will enable them to carry on the meteorological operations, as heretofore, independently of any extraneous support.

May I request you to submit this letter to the Meteorological Council,

And believe me, &c.

Robert H. Scott. (Signed) R. GRANT.

The Secretary was instructed to send the following reply :—

(P.C. 2533.)

DEAR SIR, Meteorological Office, December 13, 1883.

IN reply to your letter of the 10th instant, asking if the Meteorological Council will consent to continue their grant for the self-recording meteorological observatory at Glasgow for another year, I am directed to inform you that the Council, having carefully considered the matter, have decided to extend the grant at the present rate for six months, on the understanding that it will in no case be prolonged beyond that time, and that the Committee to which you refer are able before the expiry of the present financial year, say the end of March next, to give the Council an assurance that they think there is a reasonable expectation of the observatory being continued without the pecuniary aid of the Council after the six months for which the grant will be extended under their present decision.

Yours, &c.

(Signed) ROBERT H. SCOTT,
Secretary.

Professor R. Grant, F.R.S.,
Observatory, Glasgow.

Read—The following letter :—

(M.O. 2576.)

DEAR SIR, The Observatory, Armagh, December 6, 1883.

IN reply to your letter of the 2nd instant (2508), informing me that the Meteorological Council wishes to keep an enlarged second-class station here (possibly including a mechanically registering barograph and thermograph), I beg to inform you that I shall be happy to keep such a station on the conditions stated in your letter.

Yours, &c.

The Secretary, Meteorological Office. (Signed) J. L. E. DREYER.

The Secretary was instructed to inquire from Mr. Perry what the intentions of the authorities of Stonyhurst were with respect to that observatory (P.C. 2543).

The Secretary was instructed to make arrangements for the issue of the Daily and Weekly Weather Reports on 4to. size. He reported that a draft in MS. of a Monthly Report for November 1883 had been handed to him that day, but that he had not had time to examine it (Minutes, p. 64).

Read—The following letter (Minutes, p. 77).

BEN NEVIS OBSERVATORY.

(M.O. 2408 and 2409.) Scottish Meteorological Society,
Edinburgh, December 7, 1883.

MY DEAR SIR,

I BEG to acknowledge receipt of your letter of the 3rd instant, which I shall have much pleasure in submitting to the Directors of the Ben Nevis Observatory at their first meeting.

The barographs, thermographs, Professor Chrystal's hygrometer, and all the remaining instruments to be used on Ben Nevis and at Fort William this winter, are being packed to-day; taken by Turbyne to-morrow to Fort William, and to the Observatory first favourable day next week. I write Mr. Omond regarding your letter, and he will show every readiness to observe and transmit for you the observations you desire.

I have the pleasure of forwarding the observations of the first six days, which we received yesterday.

Faithfully, &c.

R. H. Scott, Esq. (Signed) ALEXANDER BUCHAN.

P.S.—Dec. 10th. In connexion with the Ben Nevis observations now begun, could you kindly oblige by sending me a copy of *all* the hourly observations at Glasgow and Aberdeen from

November 28th to December 12th. Turbyne will bring down with him from the observatory the observations to probably December 12th, and I wish much to compare these with your two Scottish observatories—being the only really winter observations I shall have for comparison in preparing my Report of Ben Nevis Observations of past three summers.

A. B.

The Secretary was authorised to forward a copy of the tabulations as requested.

Read—A memorandum from Captain Toynbee reporting that since the last meeting five logs had been received, two of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Lieut. Com. R. F. Hoskyn and Lieut. H. Baker.	H.M.S. "Flying Fish."	June 1—Sept. 30, 1883.	Surveying the Yellow Sea.	1883, p. 54.
Com. Hon. Foley C. P. Vereker and Lieut. A. Balfour.	H.M.S. "Magpie."	May 1—Sept. 1, 1883.	Surveying in China Seas	Lieut. Balfour, 1883, p. 36.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Vereker, and to convey the best thanks of the Council to the other observers.

Submitted—The following report :—

HAY HARVEST FORECASTS, 1883.

SIR,

I BEG to submit herewith a report on the Hay Harvest Forecasts for 1883.

The issue of the forecasts commenced with those for England E., and the Midland Counties on June 14th, and as the season advanced those for other districts were added. The forecasts were issued daily with the exception of Sundays, and in most cases were continued for a space of about five weeks. They were sent to Knutsford, however, for an additional fortnight, at the expense of Lord Egerton of Tatton.

The result of the checking shows that the general percentage of success (88) and also the proportion of completely successful forecasts is higher than even that of last year. The largest percentages were reached in Scotland E., England N.E., and England N.W.; the values being 95 and 93 respectively, while the smallest proportion of good forecasts (80) was in England S.W.

An important feature is the success with which thundery weather was forecast, more particularly in the north parts of the country.

The following is a brief resumé of the larger table on p. 83 :—

SUMMARY of RESULTS.

Districts.	Names of Stations.	Percentages.				Total Percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N.	Golspie and Munlochy	45	38	12	5	83
SCOTLAND, E.	Longniddry and Glamis	63	32	3	2	95
ENGLAND, N.E	Ulceby and Chatton (Northumberland).	70	23	7	—	93
ENGLAND, E.	Rothamsted and Thorpe	53	33	10	4	86
MIDLAND COUNTIES	Cirencester and Gerrard's Cross	40	45	13	2	85
ENGLAND, S.	Maidstone and Downton	56	34	6	4	90
SCOTLAND, W.	Islay, Dumbarton, and Stranraer	55	36	9	—	91
ENGLAND, N.W.	Leyburn, Prescot, and Knutsford	64	29	7	—	93
ENGLAND, S.W.	Glastonbury, Falfield, Clifton, and Bridgend (Glamorgan).	41	39	15	5	80
IRELAND, N.	Moynalty, Hollymount, and Antrim	47	38	14	1	85
IRELAND, S.	Ardfert, Moneygall, and Kilkenny	51	37	9	3	88
	Mean for all districts	53	35	10	2	88

The remarks made by Mr. J. Wilson and Major Smith, are worthy of note, and it may be added that the proposal to cease the forecasts was followed in several instances by a request for their further continuance.

I am, &c.

(Signed) FREDC. GASTER.

To R. H. Scott, Esq.,
Secretary, Meteorological Council.

HAY HARVEST FORECASTS, 1883.

RETURN showing the NUMBER of FORECASTS sent to each of the under-mentioned PERSONS, with the SUCCESS or otherwise of the FORECASTS.

Districts.	To whom sent.	Addresses.	No. of Forecasts sent.	No. of Forecasts checked.	Percentages.				Remarks.
					Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
0. SCOTLAND, N.	D. Melville, for the Rev. Dr. Joass.	Dunrobin Gardens, Golspie	30	30	33·3	40·0	20·0	6·7	Major Smith says that the forecasts were very correct on the whole, particularly those from the 24–29 July, the forecasts on those days being "wonderfully correct."
	Major Smith	Munlochy, Inverness	30	30	56·7	36·7	3·3	3·3	
1. SCOTLAND, E.	W. S. Macdonald	Craigielaw, Longniddry	30	30	73·3	23·4	3·3	—	
	G. Johnstone	The Gardens, Glamis, Forfar	30	30	53·4	40·0	3·3	3·3	
2. ENGLAND, N.E.	J. Turner	The Grange, Ulceby	30	30	56·7	30·0	13·3	—	Mr. J. Wilson says that owing to a very severe illness he was unable to keep a careful record, but that "there was a "much greater harmony between the "forecasts and the results than previously."
	J. Wilson	Chillingham Barnes, Chatton, Northumberland.	42	6	83·3	16·7	—	—	
3. ENGLAND, E.	Sir J. B. Lawes, Bart.	Rothamsted, Harpenden	27	27	48·2	33·3	11·1	7·4	
	W. Birkbeck	High House, Thorpe, Norwich	39	39	56·4	33·3	10·3	—	
4. MIDLAND COUNTIES	Professor Ohm	Royal Agricultural College, Cirencester.	33	33	45·3	39·3	12·1	3·3	
	Charles King, for the Duke of Somerset.	Gerrard's Cross, Bucks	27	27	33·3	51·8	14·9	—	
5. ENGLAND, S.	C. Whitehead	Barming House, Maidstone	24	24	62·5	25·0	4·2	8·3	
	E. P. Squarey	The Moot, Downton, Wilts	24	23	47·8	43·5	8·7	—	
6. SCOTLAND, W.	J. S. R. Ballingal	Eallabus, Bridgend, Islay, N.B.	30	30	46·7	43·3	10·0	—	
	W. Calder	Castle Hill, Dalreock, Dumbarton	30	30	46·7	43·3	10·0	—	
	M. J. Stewart	Ardwell, Stranraer	30	30	70·0	23·3	6·7	—	
7. ENGLAND, N.W.	G. W. Wray	Leyburn, Yorkshire	34	28	64·3	32·1	3·6	—	
	F. Harrison, for the Earl of Derby.	Knowsley Gardens, Prescot	34	34	64·7	32·4	2·9	—	
	J. F. Smith, for Lord Egerton of Tatton.	Tatton Park, Knutsford	51	47	63·8	23·4	12·8	—	
8. ENGLAND, S.W.	R. Neville	Butleigh Court, Glastonbury	30	29	44·8	34·5	10·4	10·3	Mr. W. Downing, in a letter to Mr. Neville, remarks "the weather reports "have been in great request in this "neighbourhood."
	J. Harle, for the Earl of Ducie.	Whitfield, Falfield, R.S.O.	30	30	43·3	40·0	16·7	—	
	T. Dyke	Long Ashton, Clifton, Bristol	30	30	36·7	40·0	20·0	3·3	
	Colonel J. B. Turbervill.	Ewenny Priory, Bridgend	36	36	38·9	41·7	13·9	5·5	
9. IRELAND, N.	C. C. Hamilton	Cherrymount, Moynalty	30	23	52·2	39·1	8·7	—	
	Rev. A. Brown	The Manse, Hollymount	30	30	40·0	43·3	13·4	3·3	
	J. D. Johnstone	Antrim Castle, Antrim	30	30	46·7	33·3	20·0	—	
10. IRELAND, S.	W. Talbot Crosbie	Ardfert Abbey, Ardfert	34	33	45·5	36·4	15·1	3·0	
	D. A. M'Cready	Larchvale, Moneygall	40	40	47·5	40·0	10·0	2·5	
	Dawson A. Millward	Lavistown, Kilkenny	34	34	58·8	35·3	3·0	2·9	

Mr. Scott drew the attention of the Council to the terms of Mr. Baillie's engagement (Minutes, 1879, p. 60, 1882, p. 3, Report 1881–82, p. 5). It was resolved that he should be designated Assistant Marine Superintendent, and that his salary be as at present, 250*l.* per annum.

Submitted the following statements of work for November, 1883:—

MARINE ROOM.

Examined 13 new logs. December 11, 1883.

North Atlantic Weather Charts.

Isobars and air isotherms for August 1882 completed. Sea isotherms partly done. Experimenting with the weather observations with the view of determining method of exhibiting such data on charts.

The drawing of isobars and isotherms for September 1882 commenced.

The preparation and plotting of sea and land observations for the remaining months progressing favourably.

Three charts for August 1882 reduced to one fourth the scale for experiments on the best method for showing the isobars, isotherms, and weather.

Sending out supplies of forms to captains of ships and acknowledging the receipt of sea and land observations.

A clerk engaged half his time visiting ships arriving in London, to obtain copies of the observations contained in their logs.

General.

Drawing two diagrams to illustrate the general circulation of the atmosphere, for insertion in the Barometer Manual.

The Marine Superintendent. (Signed) CHAS. HARDING.
H. T.

TELEGRAPHIC (STORM WARNING and FORECASTING) BRANCH.

November 30, 1883.

Checking accuracy of the Hay Harvest Foreasts issued in 1883: About two thirds done, and being pushed forward quickly.

Preparing Means of Temperature of Evaporation at 8 a.m., for all the Telegraphic Reporting Stations, and for each Month, during the 10 years 1871–80: Two thirds done, and being pushed on rapidly.

Preparing Monthly Weather Reports.—(Specimen copies) for issue very promptly.—*September* 1883 just commenced; *October* 1883 nearly half done; *November* 1883, work kept up to date, and *mean* values for month are being calculated.

Calculating Means of the Maximum and Minimum Temperatures at all our Telegraphic Reporting Stations, for each month, during the nine years 1872–80.—Completed, and results copied.

In addition to the above, a large amount of my own time has been occupied in preparing specimen copies of the proposed new Daily and Weekly Weather Reports, and in studying the method of preparing the values for accumulated temperature, &c.

R. H. Scott, Esq. (Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

Quarterly Weather Report:—The text of the third quarter of 1876 is nearly completed, the gale tables prepared, and progress made with the tables of movements of depressions. The charts for the fourth part of 1876 are in progress and about half completed.

Tables of mean annual pressure and temperature for stations furnishing a long series were prepared, for the purpose of tracing any variation corresponding in period to the revolution of the moon's nodes.

The latter half of the month has been occupied in tabulating and engraving barograms from several European and one Canadian observatory, for the purpose of exhibiting the atmospheric disturbance of August 27th–30th 1883. Scale values for several of these barograms had to be determined for this work.

The harmonic constants for temperature for 1875 have been worked out from the analyser results; and the analysis of the temperature curves for 1877 completed for three stations.

I attended in the Court of Queen's Bench upon subpœna for three days, and L. Powers has been working for the Computing Room during the whole of the month.

R. H. Scott, Esq., F.R.S. (Signed) R. H. CURTIS.

EXAMINATION ROOM.

SIR, December 1, 1883.

THE following *Curves* and *Tabulations* have been examined:—May 1882: *Thermograms*, five stations; *Barograms*, five stations; *Anemograms*, two stations.

June to September 1883: The Kew *Barograms* and *Thermograms* for the Annual Report.

I have also been engaged on work in connexion with the remarkable barometric disturbances of August 27th–29th, 1883.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Office.

(Signed) T. E. Allen.

Mr. Scott reported (1) that Mr. H. Cobley was seriously ill, and that Dr. Wilson Fox had recommended that he be allowed to work at home during the winter as much as practicable, and (2) that work which could be done at home could be conveniently found for him. Mr. Scott was authorised to allow Mr. Cobley to work at home.

Reported—That the following cheques have been drawn during the month of November:—

			£	s.	d.
Nov.	3rd.	For weekly salaries	29	6	11
„	9th.	F. Gaster, attendance at Glasgow	7	15	3
„	„	C. E. Strachan, Arctic work (Minutes, May 10)	2	5	0
„	„	Johnson, Matthey, & Co., chemicals	2	12	8
„	„	J. J. Hicks, instruments	17	16	8
„	10th.	For weekly salaries	29	6	11
„	17th.	Do. do.	29	11	11
„	„	Wightman & Co., bookpost wrappers and printing	8	14	6
„	„	T. De La Rue & Co., sunshine cards	8	15	0
„	„	Captain H. Toynbee, inspections in Ireland	10	18	11
„	„	G. Neumayer, synchronous observations	2	0	6
„	24th.	For weekly salaries	29	11	11
„	30th.	R. H. Scott, salary	66	13	4
„	„	J. S. Harding, jun., salary	27	15	6
„	„	T. D. Bell „	14	8	10
„	„	J. E. Cullum (Valencia), salary	16	13	4
„	„	R. H. Curtis – Discussion, &c. of observations	22	4	5
„	„	J. A. Curtis – Discussion, &c. of observations	16	3	7
„	„	T. E. Allen – Discussion, &c. of observations	15	11	1
„	„	C. H. Thompson – Discussion, &c. of observations	11	3	4
„	„	H. N. Cobley – Discussion, &c. of observations	10	5	11
„	„	E. G. Aldridge – Discussion, &c. of observations	7	16	8
„	„	F. Gaster – Preparation, &c. of Weather Reports.	30	12	8
„	„	F. J. Brodie – Preparation, &c. of Weather Reports.	19	13	0
„	„	G. G. Francis – Preparation, &c. of Weather Reports.	19	18	8
„	„	A. J. Rigby – Preparation, &c. of Weather Reports.	15	0	0
„	„	R. Sargeant – Preparation, &c. of Weather Reports.	13	0	3
„	„	Capt. H. Toynbee – Discussion, &c. of observations and care of instruments.	33	6	8
„	„	Nav. Lieut. C. W. Baillie, R.N. – Discussion, &c. of observations and care of instruments.	20	16	8
„	„	R. Strachan – Discussion, &c. of observations and care of instruments.	27	15	6
„	„	C. Harding – Discussion, &c. of observations and care of instruments.	22	4	5
„	„	H. Harries – Discussion, &c. of observations and care of instruments.	13	6	8
„	„	W. Allingham – Discussion, &c. of observations and care of instruments.	13	6	8
„	„	W. G. James – Discussion, &c. of observations and care of instruments.	9	12	0
„	„	Pickford & Co., carriage of parcels	0	18	10
„	„	Royal Meteorological Society observations	16	13	4
„	„	Typo-Etching Co., engravings for Quarterly Weather Report	3	7	6
„	„	Chance Bros., sunshine ball (commission account)	3	15	0
„	„	J. S. Harding, jun., petty cash	50	0	0
			£701	0	0

Resolved—That a bonus of 3*l.* 3*s.* be allowed, as in former years, to those of the telegraphic reporters who have observed for a complete year.

116, *Victoria Street, January* 9, 1884.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 12) were read and confirmed.

Read—The following letter :—

(M.O. 2735.) The Observatory, Glasgow,
DEAR SIR, December 27, 1883.

I BEG, on the part of the University of Glasgow, to return sincere thanks to the Meteorological Council for their offer to continue the usual allowance to this observatory for six months beyond December 31, 1883, the term originally decided upon. I have to inform you, however, that other arrangements have been made which will enable the observatory in the meantime to continue the usual meteorological work independently of any extraneous aid.

The University authorities accept very thankfully the kind offer of the Meteorological Council, announced in General Strachey's letter of February 23, to place at their disposal for this purpose the meteorological instruments in the observatory belonging to the Council.

Yours, &c.
Robert H. Scott, Esq. (Signed) R. GRANT.

Mr. Scott was instructed to reply as follows :—

SIR, Meteorological Office, January 14, 1884.

I AM directed by the Meteorological Council to inform you that it has given them much satisfaction to learn that an arrangement has now been made under which the self-recording observatory at the Glasgow University will be maintained from local resources.

The Council accordingly confirm the offer before made to you by which they agree to place the self-recording and other instruments at the observatory belonging to the Council at your disposal, so long as the registry is maintained on the general system hitherto followed.

The Council trust that it will be found consistent with your arrangements to supply the Meteorological Office with the duplicate photographic records and traces of the anemograms, as heretofore, and that, if occasion should arise, you would also comply with any request to furnish the Office with numerical values, it being understood that the Council would, if it were thought proper, defray the cost of copying the data furnished.

The Council further request that you will supply the Office with monthly returns on the accompanying form, being that adopted for Stations of the Second Order, and designed to furnish data indicating the general local conditions of climate.

For this information also the Council will be prepared, if it is so desired, to make a suitable payment.

It will also, doubtless, be thought reasonable by those who undertake the maintenance of the self-recording instruments, that reasonable notice should be given to the Council of any intention of discontinuing the present arrangement in the future, should it become necessary. It will also be convenient that some formal communication should be made to the Council of the nature of the body which undertakes to give effect to these arrangements, and that you are duly authorised to act in their behalf.

Lastly, I am to add that the Council would wish that the self-recording instruments should be periodically inspected as heretofore, by one of the trained officers from Kew, who would assist you in testing them and ascertaining whether any defects existed, and how best they might be removed.

It would be the wish of the Council that no material change of system in the management of the instruments should be made without their previous concurrence, and the expediency of this will, no doubt, commend itself to you.

I am, &c.
Professor R. Grant, F.R.S., (Signed) R. H. SCOTT.
Observatory, Glasgow.

Read—The following letter (Minutes, p. 81) :—

(M.O. 36.)
DEAR MR. SCOTT, Stonyhurst, Whalley, January 3, 1884.

PLEASE inform the Council of the Meteorological Office that I wish to retain all the instruments that I possess at present, as I do not intend to make any change, either in the methods of observation or in the hourly measurements. I also purpose sending you, as usual, all the results

that may be useful at the Meteorological Office, and I only request in return such a grant as the Council may consider reasonable for the maintenance of a secondary station. I shall be able to send either the 9 a.m. and 9 p.m. readings, or the mean of the 24 hours, whichever you prefer, for I intend to continue the use of the mean values for the monthly tables of my observatory report.

As Stonyhurst Observatory is at present a fairly complete physical observatory, I would make any sacrifice rather than allow any branch of the work to deteriorate. I think any scientific man would acknowledge that there is a very great advantage in uniting under the same roof the complete registration of meteorological as well as magnetic phenomena, especially if they can be combined with solar work, and this I have been long endeavouring to secure at Stonyhurst. And besides, I cannot forget that the continuous record of the barometer and thermometer have already been shown to be of special value in a part of the country which is the centre of the coal districts.

The greater part of the expenses will be found by the authorities of the College, and, therefore, as the demands on their purse will be very heavy indeed for many years to come, I do not hesitate to apply to the Council for the grant they may judge fit to allow to the observatory as a secondary station.

Yours, &c.
(Signed) S. J. PERRY.

Mr. Scott was instructed to reply as follows :—

SIR, Meteorological Office, January 14, 1884.

I AM directed by the Meteorological Council to inform you that it has given them much satisfaction to learn that an arrangement has now been made under which the self-recording observatory at Stonyhurst College will be maintained by that institution.

The Council accordingly confirm the offer before made to you by which they agree to place the self-recording and other instruments at the observatory belonging to the Council at your disposal, so long as the registry is maintained on the general system hitherto followed.

The Council trust that it will be found consistent with your arrangements to supply the Meteorological Office with the duplicate photographic records and traces of the anemographs, as heretofore, and that, if occasion should arise, you would also comply with any request to furnish the Office with numerical values.

The Council further request that you will supply the Office with monthly returns on the accompanying form, being that adopted for Stations of the Second Order, and designed to furnish data indicating the general local conditions of climate.

In consideration of the supply of the information thus asked for, the Council will be prepared to make from the funds at their disposal an annual grant of 50*l.* to Stonyhurst College, it being understood that a year's notice will be given before it is withdrawn.

It will also, doubtless, be thought reasonable by the Reverend Rector, when undertaking the maintenance of the self-recording instruments, that reasonable notice should be given to the Council of any intention of discontinuing the present arrangement in the future, should it become necessary.

Lastly, I am to add that the Council would wish that the self-recording instruments should be periodically inspected as heretofore by one of the trained officers from Kew, who would assist you in testing them and ascertaining whether any defects existed, and how best they might be removed.

It would be the wish of the Council that no material change of system in the management of the instruments should be made without their previous concurrence, and the expediency of this will no doubt commend itself to you.

I am, &c.
(Signed) R. H. SCOTT.

Rev. S. J. Perry, S.J., F.R.S.,
Stonyhurst College, Blackburn.

Read—The following letter :—

(M.O. 81.) The Observatory, Armagh,
DEAR MR. SCOTT, January 8, 1884.

THE Lords of the Treasury have declared their intentions with regard to this observatory. They will give 2,000*l.* on condition that the interest be spent on instruments only. I mention this, as the Meteorological Council in their letter of December 3 said the allowance of 50*l.* to the observatory was to be reconsidered "when the pending proposal as to a Treasury grant to the "observatory is disposed of."

Under the circumstances, I hope the Council will maintain the grant.

Yours, &c.
(Signed) J. L. E. DREYER.

Resolved—That the grant to Armagh be continued subject to the previous arrangement (Minutes, p. 76).

Mr. Scott submitted the following report of his visit to Falmouth (Minutes, p. 76) :—

GENTLEMEN,

I HAVE the honour to report that, in accordance with your instructions, I visited Falmouth, and on the 14th ultimo I inspected, in company with Messrs. Howard and W. L. Fox, the new sites

proposed for the observatory to be erected at Falmouth. They are all situated on land now vacant, but to be shortly covered with buildings.

The present observatory is seated on the brow of a steep hill over the harbour at the height of 173·5 feet, being a slope of 1 foot in 4·6.

Site A. lies nearly 400 yards west of the observatory, and at an elevation 20 feet higher.

Site B. is close to site A., and at the same level.

Site C. is distant 200 yards further than A., and in the same direction. Its elevation is 163 feet, and the ground falls away from it at a slope of 1 foot in 14·6, to a watercourse, level 40·4 feet, leading to a pond called Swan Pool.

Of these sites the last-named appears to me to be the best, for although the two former are situated on the rounded top of the hill, while C. is on its western slope, the ground about C. is to be covered with detached villas, while that adjacent to the other sites will be given up to streets and terraces, and although some of the roads are to be 50 feet wide, I consider that much more open space will be available at C., which lies at a cross road, than at either of the others.

The actual site obtainable at C. will probably be sufficiently spacious.

For these reasons I beg to report that C. is the most eligible site for an observatory that has been shown me at Falmouth.

ROBERT H. SCOTT.

Mr. Scott drew the attention of the Council to the necessity for supplying a new anemograph to Valencia, and to the importance of rendering the thermograph exposure at Valencia, Aberdeen, and Kew more uniform as to height above ground than it has hitherto been.

Mr. Scott was requested to report :—(1.) As to the means of calculating a comparison between the thermometric observations at Valencia taken in the thermograph screen and in the Stevenson's screen respectively, the work to be done outside the Office.

(2.) As to the possibility of instituting a comparison at Aberdeen between the thermograph screen and a Stevenson's screen to be placed in the field below.

The consideration of the anemograph was postponed with a view to endeavouring to ascertain whether a system of electrical communication between the instrument and a station at some distance could not be devised.

Mr. Scott was instructed to make inquiries as to finding a suitable observer if a telegraphic reporting station were established at Belmullet.

Submitted—The following reports (Minutes, 1882, p. 66; 1883, p. 11):—

(M.O. 2711.)

REPORT on the WORKING of the PHOTO-NEPHOGRAPH of Captain ABNEY.—*See* Report Meteorological Council 1881, p. 33. Submitted to the Kew Committee November 8th, 1883.

Since last meeting of the Committee I have on various occasions experimented with the two cloud cameras of Captain Abney as follows :—

1. A base line 180 yards in length was measured off on the level path leading to the observatory, and clearly marked by small trenches being dug in the turf. The direction of the base line is N.W. to S.E. approximately.

2. A carriage was constructed to carry an 8-cell Le Clanché battery, necessary to work the shutters of the two cameras, the reel to carry the 180 yards of double wire and a second small reel to join the carriage to the camera at the home station.

3. A telegraphic code of signals for enabling the operators to work together has been prepared, the signals being made by shrill whistles and the arms, and a drill has been drawn up and practised so that the experiments may be made properly and systematically.

4. Experiments have been made on 12 days, and 2½ doz. plates prepared by Captain Abney used, as well as nine pieces of Morgan and Kidd's A.B.G. paper exposed, which gives very satisfactory results.

5. The distances of the Pagoda in the Royal Gardens and of St. Matthias Church on Richmond Hill, have been determined by means of the cameras, and also the height of the top of the steeple of the latter object measured. The results of the latter determination accord very well with the true values :—

	Camera.	Map.
	6,588 ft.	6,250 ft.
Height -	305 „	290 „

6. Experience with the working of the instruments have indicated the following defects and suggestions as to their remedies.

The defects of the cameras are as follows :—

(*a.*) Want of balance. When directed approximately horizontally, there is an unbalanced weight of about 3 lbs. + weight of wire dependant, which entirely disturbs the levelling, no matter however carefully it may have performed previously.

(*b.*) The levelling and clamping screws at the base are defective and quite unsuited for the work.

(*c.*) The sights are extremely rough and quite incapable of affording accurate settings.

(*d.*) The dividing of both altitude and azimuth circles is very coarse, verniers only reading to 10′.

(*e.*) Neither circle is provided with fine motion screws.

(*f.*) The clamps are too weak to give sufficient rigidity.

(*g.*) The tripods, being sliding ones without locking-pins, are continually slipping and disarranging the level.

(*h.*) The marks to indicate the different cameras and slides should be engraved on the plates, the original ink marks having been rubbed off.

7. *Suggestions.*—If the instruments are to be brought into regular use, I would suggest that the following alterations should be adopted:—

(*a.*) The cameras should be properly mounted as surveying instruments, and the field of view, which at present only covers 37°, might with advantage be increased. Telescopes, or proper sight tubes, must be provided, and might be fixed so as to assist in balancing the cameras.

(*b.*) Steps should be taken to use fixed piers for observation instead of the present ligh t tripods or in the event of taking a longer base, trucks or light carriages might be built, which, whilst forming a more rigid support, would at the same time serve for the transport of battery, reel, and a telephone or some other signalling apparatus, which is needed.

Instead of having two or three loose wires to reel off, a light cable might be made and wound on a hose reel.

(*c.*) The present photographic plates answer admirably, but it is a question whether it might not be more convenient to have a roll of paper and reel off fresh lengths instead of changing the plate-holders when it is desired to take pictures in rapid succession.

(*d.*) Instead of a plain +, scales of degrees should be engraved on the dark slide plates.

8. With the existing rough arrangements, it has not been found possible to fix the height of more than one cloud, which was found to be about 3½ miles, the angles subtended by the present base being about 1° for 5 miles, 6° for 1 mile are too small to be easily measured with the coarse sight now fixed to the cameras.

Appendix to Report. December 15th, 1883.

Having been unable to see Captain Abney prior to the presentation of the preceding report to the Committee, owing to that gentleman's illness and absence, I find that I made several statements therein, which the remarks of Captain Abney, who was present at the Committee meeting, render it desirable to alter. These I will take seriatim.

In the first case, Captain Abney had not in view the employment of the cloud cameras for regular use, but considered them as experimental, hence the defects *b*, *g*, and *h* enumerated in par. 6. Defects *d* and *e* are due to the instructions of the Meteorological Council as to the degree of refinement necessary in the construction of the instruments. Defect *c* is based on a misunderstanding, it being intended that the setting of the cameras in position should be made by means of the × in the plate-holders, the sights being only for rough guidance as to the extent of the field of view.

The Kew Committee have suggested that the cameras should be returned to Cambridge to the maker to have defects *a* and *f* rectified.

The suggestion *c* was founded on a misconception as to the nature of the operation of determining the rate of motion of the clouds. Captain Abney has pointed out that it is possible to expose the same plate more than once, and I have since succeeded in obtaining two pictures of a cloud on one negative at an interval of a minute.

With a view to conveniently carrying out further experiments at the observatory, I have set up stout wooden piers at either extremity of a base line of 130 yards, measured North and South along the lawn, and have laid an electrical wire down in the ground connecting the North pier with the battery placed in the workshop.

I have also arranged the cameras so that when placed on the piers their azimuth readings are alike; this being the case, the B camera is now directed by the observer at A chalking his altitude and azimuth on a large slate, which the observer at B reads through an opera glass.

Opportunities of utilising the modified arrangements have not yet occurred, and therefore I am unable to state the results other than this. We have not succeeded in recognising cirrus cloud sufficiently, when two pictures of a mass have been taken on one plate, to enable us to arrive at any conclusion as to its motion.

(Signed) G. M. Whipple.

Kew Observatory, December 15, 1883.

Report on the Working of Professor Balfour Stewart's Actinometer at the Kew Observatory.

(M.O. 2711.)

This instrument was set up at the Kew Observatory in June 1882, and has since been observed on every suitable occasion, and the results of 97 sets of observations are submitted herewith.

At the suggestion of General Strachey, they have been plotted on the system described by M. Marié-Davy in the "Annuaire de l'Observatoire de Montsouris pour l'an 1882," p. 36, using for the purpose the tabular values of ϵ given in that work, pp. 49–51. The results exhibited in the diagram appended have been submitted to the Kew Committee.

The discordance between the different values obtained being considerable, and the opinion of the Committee being that the instrument in its present form is unsuitable for the purpose of accurately exhibiting the intensity of solar radiation, they have at their last meeting (December 4th) passed the following resolution:—

"That further observations with Professor Balfour Stewart's actinometer be discontinued, pending a proposal for the observation of solar radiation by Captain Abney."

In accordance with the above resolution the instrument has been temporarily dismounted from its stand, and stored in the observatory.

(Signed) G. M. WHIPPLE.

Kew Observatory, December 17, 1883.

Submitted—A proof of the Weekly Weather Report in 4to size, to contain the results of accumulated temperature, with an explanatory Preface (Minutes, pp. 22 and 81).—The Report was approved for immediate issue. The Preface to be further considered.

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, five of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. Brabazon J. Barlow, R.N.R.	S.S. "Amarapoora."	Sept. 19—Dec. 20, 1883.	Liverpool to Rangoon.	—
Capt. W. R. Cato, kept by Mr. R. Ladd.	S.S. "Scotia" -	Nov. 2—Dec. 23, 1883.	Cable laying in North Atlantic.	1883, p. 54.
Capt. A. W. Jeffery	S.S. "Teniers" -	Sept. 14—Dec. 15, 1883.	South America, New York, and home.	1883, p. 54.
Capt. A. M'Dougal	"Auckland" -	May 8—Dec. 12, 1883.	London to New Zealand and home.	1883, p. 4.
Capt. H. Walker -	S.S. "Parthia" and S.S. "Cephalonia."	June 14—Dec. 29, 1883.	Liverpool, Boston, or New York, 5 voyages.	1883, p. 36.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Barlow, and to convey the best thanks of the Council to the other observers.

Submitted the following report:—

SIR, Meteorological Office, December 31, 1883.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st December 1883.

The mean pressure chart of the Atlantic Ocean for the month of August has been completed, and I had the honour to submit it to the Council on the 14th November. The chart for February will be finished during the next month. I have also been occupied drawing specimen charts of the North Atlantic synchronous work, which have been laid before the Chairman at various times.

During the temporary absence on one month's leave, I discharged the duties of Marine Superintendent, and I have myself been absent from duty for ten days, summer vacation.

I am, &c.
(Signed) C. W. BAILLIE,
Nav. Lieutenant, R.N.
H. T.

Captain Toynbee,
Marine Superintendent.

Submitted—The following memorandum:—

MEMORANDUM.

THE data for August 1882 have now been inserted on the large working charts. Isobars and isotherms of air and sea temperatures have also been drawn upon them.

The accompanying six copies of lithographed specimens of two reduced charts have been prepared at the Chairman's request.

When the Council have decided on the method for representing the data, the weather and generalised wind arrows for August 1882 can be prepared for insertion on the reduced charts.

A third reduced chart (representing air and sea isotherms on the sea in *black*, and air isotherms over the land as well as weather-shading in *brown*) has been prepared by Mr. Baillie, to show how the whole of the data as well as the shading of land might be given by means of two colours only.

Even should the Council decide to print in three colours, brown might be used for shading in the weather instead of red, as red shading might interfere with the red isotherms, especially if, as has been suggested, the red isotherm is to be the thinner of the two.

(Signed) HENRY TOYNBEE.

R. H. Scott, Esq., Secretary.

The modified system of representing the force of wind was approved, with a black spot instead of a star for squalls.

The land to be covered with a flat tint of brown, to be printed by lithography.

The air isotherms to be red and the sea isotherms black. The former to be rather thinner than pattern, the latter rather thicker.

All the isobars to be rather thinner, maintaining a good distinction between 29·9 and the others.

The weather indications to be in red, as shown.

The size and arrangements of the chart are generally approved.

Read—Letter No. 2712 from the Royal Meteorological Society, stating that the cost of printing and illustrating Mr. C. Harding's paper on the gale of September 1 would be 37*l.* 4*s.* (Minutes, p. 51).

Resolved—That the sum of 15*l.* be granted towards the expenses of production of the paper, and that the Society be requested to supply 100 copies of the paper to the Office.

Submitted—The following report :—

(M.O. 114.)

REPORT of the ENGLISH METEOROLOGICAL STATIONS, 1883.

TELEGRAPHIC REPORTING STATIONS.

London (*Brixton*), visited June 19th.—I found everything in excellent order. Continuous barometric comparisons having been carried on between the instrument at this station and those at the Meteorological Office, it did not appear necessary to make any on this occasion.

Jersey (*Noirmont*).—I inspected this station on June 26th and 27th. I took with me the "uncontracted" Adie's barometer 531, to be substituted for the check barometer 416. It was in good order, but read ·008 higher than the reporting barometer (the Kew corrections being applied). I found the instruments at this station in admirable order, and the observer is most painstaking. He estimated the wind-force as 4 on the 26th, when my estimate was 5.

Hurst Castle, inspected June 30th—The instruments at this station were in good order. The observer seems fairly careful, but makes occasional mistakes.

Prawle Point, inspected July 1st.—The observations at this station are most carefully taken, and the instruments are in excellent order. The instruments read well together. The observer, Mr. J. Johns, will quickly learn cloud observing, and I think that cirrus reports from this station would have considerable value.

Scilly (*St. Mary's*), inspected July 5th and 6th.—Wooden stays have been attached to the anemometer turret, which now vibrates but little in a storm. A portion of the iron of the case has been filed away, so that the pendulum does not touch the side. The clock required cleaning, parts of the works being somewhat rusted. The anemograms are not very distinct, the fault being due not to the instrument, but to the effects of salt and damp upon the paper. The observer's estimate of wind-force is in better accord than formerly with the anemograms, but is now a trifle lower than the average estimate of the English observers. Both the reporting and check barometers were in absolute accordance with the standard 590. I do not think that the observer can be made capable of thoroughly distinguishing the different forms of clouds.

York, inspected October 14th.—The observations at this station show slight improvement as regards the accuracy of the observer's readings. Since the resignation of Mr. Keeping, the curatorship of the museum has been vacant, and the meteorological work is entirely in the hands of Mr. Wright, the gardener. The reporting barometer (No. 156), which when last compared appeared to have a minus error, read on this occasion as much as ·045 above my standard. The instruments had been suspended together for four hours, but at the time of the comparison the mercury was oscillating considerably. A good vane is wanted here, and in its absence the observer's estimate of the direction of the wind is not always accurate, *e.g.*, on the day of my visit, trusting to the Minster vane the observer noted the wind as South, when it was S.S.E. The minimum thermometer (M. O. 64) reads somewhat low.

Spurn Head, inspected October 26th.—Since my last visit the barometer, formerly employed as a check instrument, has been adopted as the reporting barometer. (The instruments, however, not having been shifted.) Though reading higher than the instrument previously employed, it gave low readings as compared with my standard. The outdoor instruments are in excellent condition. I gave orders that the screen should be moved so as to face due North, which has since been done. Orders were given that no corrections for the thermometer readings should in future be used by the observer, the latter having acquired, I know not whence, the habit of adding in his reports one degree to the readings of the minimum. The thermometers read very well together, and agreed with the standard. The observer appears very accurate in his estimate of wind and sea disturbance. The latter is estimated by the motion of the lightship outside, whenever this is visible, the tide producing peculiar seas upon the point itself.

North Shields, visited October 17th.—As was the case in 1882, the wet-bulb thermometer of this station was found in a very foul condition. The other instruments were in good order, excepting the spare thermometer, which is valueless. The old rain-gauge continues in good order.

SECOND ORDER STATIONS and those furnishing WEEKLY WEATHER REPORTS.

Hastings, St. Leonards, inspected June 22nd.—All the instruments were found to be in particularly good order, and the observations are well kept up. The screen, which was blown down in 1881 (the last time that the station was inspected), was shortly afterwards repaired, and is now firmly fixed in asphalt.

Southampton, inspected 25th.—The work at this station continues to be admirably conducted. The observer happened to be absent on leave on the occasion of my visit. I found that his assistant read the instruments and made the reductions correctly. The undesirable alterations in the site of the outdoor instruments mentioned in my report of 1882 would in any case have become necessary now, as the ground on the north side of the Ordnance Survey Offices is now fully occupied by new computing rooms. The returns from the station are excellent, and it may be mentioned that the observer distinguishes cloud forms with unusual facility.

Jersey, St. Aubin's.—I visited this station on June 27th, but did not dismount the instruments, as the observer expressed a wish that this should not be done, if avoidable. They are all unchanged and have been frequently and satisfactorily tested. Everything was in good order at the station, and the returns continued to be very complete.

Totnes, inspected July 22nd.—Everything at this station was found in good order. Since my last visit the screen had been, for the convenience of the observer, shifted 13 yards S.E. by S. of its former position, a change which can produce no effects on the readings. The situation of the station appears to me to be such as to favour rather high maxima of temperature for this part of England. In confirmation of a previous surmise based on the position of the higher ground round the station, the vane, at the time of my visit, pointed two points to the right of the direction of the general surface wind.

Helston, inspected July 3rd.—All the instruments at this station were found to be very good and in excellent order. The barometer has never been verified at Kew, but its readings underwent more than 60 comparisons at Falmouth Observatory in September 1882. The two comparisons made by me were in agreement with those determined at Falmouth. The corrections in the Kew certificates for maximum and minimum thermometers prove to be now certainly inaccurate, and the observer has, since the time of my visit, adopted other corrections which were provisionally determined by me. The observer at this new station, Mr. J. Gill, appears to be painstaking and accurate.

Leicester, inspected July 18th.—The instruments were found to be in tolerably good order. The observer's reading of the barometer was as much as ·02 below my reading of the same instrument, the error being due to misadjustment of the fiducial point. The curator of the museum expressed his readiness to have the instrument shifted at a future time to a position where the light will be somewhat less inconvenient.

Peel (*Isle of Man*).—I visited this new station on October 12th. The altitude of the ground above sea level, as determined by barometric comparisons, is 137 ft. The country around is hilly, but the station has a very fair exposure, with a good view seaward (West). In the earlier returns from this station there were a few errors, but at the time of my visit the observer, Mr. T. H. Davis, read the instruments with the greatest rapidity and accuracy. He has a resident assistant who is quite competent for the work. All the instruments were found to be in excellent order, excepting the rain-gauge, which had received an injury to the rim, and was about to be replaced by another instrument. There are also self-recording vanes and rain-gauges of the observer's own design.

Douglas (*Isle of Man*), October 12th.—The instruments at this station were found, as on previous occasions, in excellent order. The former assistant having left, and the present assistant being not quite competent for hygrometric reductions in Mr. Moore's frequent absence, the reductions have been somewhat interrupted. The observer set the vernier of the barometer much too low, an error shared to some extent by the assistant. Instructions were given on this point.

York, inspected October 14th.—The observer has, I think, made some further progress since the date of the former inspection, but the observations are still somewhat rough, and those on the direction of the wind do not appear to be always trustworthy. There have been some interruptions in the sunshine records, which it may be hoped will not again occur.

Alnwick (*Northumberland*), inspected October 18th.—Major Holland, who conducts the observations for the Duke of Northumberland, was absent on the day of my visit, but I obtained permission from his Grace to examine the instruments. I was unable to dismount the thermometers. They are good instruments and read correctly, as compared with my standard, in air. They have a good window-exposure facing North, but their height above the level of the ground (21 ft. 9 in.) is objectionable. A correction for altitude is made in the reports. Their altitude above the sea level is 202 ft. 10 in. The barometer is a good Fortin. The anemometer has a good position, but the connexions are long and complex. During northerly gales the direction pencil has hitherto shifted its position to South-East. This fault may have been due to the loosening of a bush in the horizontal portion of the direction shaft. The rain-gauge which is fairly exposed, is 178 feet above mean sea level.

Hesley Hall (*near Bawtrey*), inspected October 19th.—The observations are usually taken by Mr. Whitaker's gardener, who is a competent observer. The instruments were in good order. The Stevenson's screen has not a very perfect exposure, and is not over grass. The rain-gauge is also considerably sheltered by a fruit tree on the North side. Mr. Whitaker promised to consider the question of removing the outdoor instruments to a site upon the lawn, where their exposure will be very good.

The following tables show the differences between the observer's and the inspector's readings of the barometers at the stations, a mean of several readings being usually taken ; a plus sign indicates that the observer read higher, and a minus that he read lower than the inspector. In the barometric comparisons corrections have of course been applied, where necessary, for differences in the temperature of the mercury, and for differences of level of the cisterns. Also the thermometric comparisons. The thermometers have all been compared in water (with the exception of those at Alnwick Castle), which has been of as uniform a temperature as possible, and has been kept well stirred.

Where several comparisons have been made, the mean result has been recorded. The asterisk indicates that the Kew correction has been applied to the observer's instrument, previously to comparison; its absence that it has not been applied.

TELEGRAPHIC REPORTING STATIONS.

Station.	Barometers.			Thermometers.				
	Difference of Observer's from Inspector's Readings.	Reporting.	Check.	Temp. of Water.	Dry Bulb.	Wet Bulb.	Max.	Min.
Hurst Castle - -	—·001	—·016	—·019	63°	0°·0	0°·0	0°·0	—0°·7
Jersey - - -	—·001	—·006	+·006	60	0·0	+0·2	+0·1	0·0
London - - -	—	—	—	58	0·0	—0·1	—0·2	—0·1
Prawle Point - -	—·002	—·004	—·006	62	—0·1	0·0	+0·1	—0·3
Scilly - - -	—·001	·000*	·000*	61	0·0	0·0	+0·1	+0·2
Shields - - -	—·001	—·003	—·005	53	0·0	+0·1	0·0	—0·4
Spurn Head - -	0·0	—·010	—·015	53	—0·1	+0·1	+0·1	—0·4
York - - -	0·0	+·045	—	53	—0·1	+0·1	+0·2	—0·6

STATIONS furnishing MONTHLY and WEEKLY REPORTS.

Station.	Barometers.		Thermometers.				
	Difference of Observer's from Inspector's Readings.	Error of Barometer as compared with Inspector's Standard.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass Minimum.
Alnwick - -	—·001	—	—	—	+0°·1	+0°·1	—
Bawtry - -	+·001	—·004	—	—	0·0	—0·1	—
Douglas - -	—·008	—·002*	0·0*	0·0*	0·0*	—0·1*	—
Hastings - -	0·0	—·004*	0·0*	—0·1*	—0·1*	—0·1*	—
Helston - -	+·004	—·001	—0·1*	—0·1*	—0·6*	—0·9*	—
Jersey - - -	0·0	—	—	—	—	—	—
Leicester - -	—·020	—	0·0	+0·2	0·0	—0·5	—0·6
Peel - - -	—·001	—·004*	0·0*	—0·3*	+0·1*	—0·3*	—2·1*
Southampton - -	+·001	—·006	—0·1*	—0·1*	—0·1*	0·0*	—0·2*
Totnes - -	—·001	—	—0·1*	0·0*	0·0*	0·0*	—
York - - -	0·0	+·045	—0·2	0·0	—0·5	—0·5	—

Illness and family bereavement interfered with my work of inspection in the summer, and when it had been resumed in the autumn, it was, to my deep regret, interrupted by another and severe attack of illness.

PROPOSED NEW SITES for TELEGRAPHIC REPORTING STATIONS.

I have the honour to report that, in accordance with your instructions, I visited Dungeness on June 21st, for the purpose of considering the suitability of that locality as a telegraphic reporting station, in lieu of Dover. The place affords as perfect a situation for wind observations as can probably be found in the British Isles. There are no hills or even undulating ground within eight miles of the Ness. The beach (as will be seen from the chart which I send with this report) is about two miles in width. It consists of gravel, broken only by patches of dwarf broom and foxgloves, and nowhere, I think, reaches an elevation of more than 50 feet above mean sea level. Further inland the ground is almost equally flat, marshes and pastures extending about 11 miles to the N.W. of the Ness. The lighthouse, which is close to the railway station, and at the extremity of the headland, is 120 feet in height. The outlook from the windows is most excellent, and on the day of my visit Cape Grisnez was very distinctly visible to the naked eye. There are (as is usual in a lighthouse) excellent positions for a barometer, where the light is good and the temperature equable. There is at present a barometer 84 feet above the base of the tower, and about 100 feet above mean sea level. I found that the principal of the lighthouse, Mr. Lloyd, and one of the light-keepers, Mr. Cutting, were able to read this instrument, records of which are entered three times a day, with facility, and Mr. Cutting especially, who was many years at the Longships, showed much experience in weather watching. On the west of the lighthouse is a small potato garden, in which is a piece of waste ground where the outdoor instruments would have a very fair exposure. I am of opinion that, with the permission of the Trinity House, Dungeness light would afford an admirable telegraphic reporting station. The telegraph office at the railway station was not at the time of my visit open at those hours of the day at which the observations would have to be wired, and Lloyd's signal-box, to which the telegraph line has recently been carried, is distant 500 yards to the North-West.

This last locality affords an alternative position for the instruments. A circular mound, as shown in the chart, marks the position of the former fort, and protects the houses of the coastguard from the wind, as well as from the water, which soaks through the gravel in winter.

The small signal-box and telegraph station is on the South-West of the circular mound, and is 730 yards from the beach. It would itself be a very inconvenient position for the barometer. A small house was about to be erected for the telegraph clerk, but in the absence of Mr. E. D. Young, the divisional officer at Lydd, I failed to ascertain the site which it would occupy. The coastguard houses, which I examined by the permission of Mr. Gibbs, the chief officer, are somewhat small, and unsuitable for barometers. The outdoor instruments would here require to be enclosed in some small plot of ground (which might be obtained at a nominal rent from the War Office), on the top of the mound. The outlook here is slightly inferior to that at the lighthouse.

I may be allowed to express my strong opinion that the substitution of Dungeness for Dover as a telegraphic reporting station would be a great success. Serious as the objections are to the breaking off of a series of records which have been carried on for so long a time as those at Dover, I cannot help thinking that the sooner this course is taken the better, considering the necessarily unsatisfactory character of the reports from Dover. The character of the ground at Dover renders the wind reports of little use, the position of the outdoor instruments is faulty in the extreme, and that of the barometers is not good. And if the evil of discontinuity be considered very great, I think that on this very ground a plea can be urged in favour of Dungeness. The death or removal of an observer at Dover might cause a great or even total breakdown of the observations, while the light-keepers form a permanent, as well as to a great extent a necessarily efficient, corps of observers. And nearly as much may be said of the coastguard officers (who are, however, more frequently changed than the light-keepers at Dungeness).

I visited St. Catherine's Point on the 29th of June, and must report unfavourably of it as a site for a telegraphic reporting station. Lloyd's new signal station is in very hilly and broken ground. The view seaward is very good, but on the North and North-West the ground rises steeply and in some places precipitously. Mr. G. Brown, chief signalman, would require some instruction in the instrumental work, should it be determined to establish a station here. There is a telephone to Niton. From the lighthouse, distant about half a mile to the South-West of the signal station, an excellent view is obtained eastward, southward, and westward. It seems, however, impossible to doubt that the very high ground on the North must affect the winds at this place to a very great extent. The ground here rises in the immediate North at a slope of about one per 7·4 to the height of 750 ft. from the position of the lighthouse, which is close to the sea. It is, moreover, exceedingly irregular, as shown in the chart sent with this report, the high land being intersected by deep chines. The manner and degree in which the orographical character of the neighbourhood influences the winds might be ascertained by an examination of the wind-reports kept in the lighthouse. This, however, I did not ascertain, having neglected to obtain permission to copy the records from the Trinity Superintendent for the district. Sea disturbance is, I think, the only element that would be reported better from this place than from Hurst Point, for though the winds in the Solent suffer considerable deflection, those at St. Catherine's probably suffer more, and in respect of wind force the observations at Hurst Point are likely to be far more useful than observations taken at St. Catherine's Point.

(Signed) W. Clement Ley.

Read—Letter 2704 from the Chief Signal Office, Washington, inquiring as to the possibility of changing the hour of the simultaneous observation taken at 12h. 8m. Greenwich time, to Noon, Greenwich time, from January 1, 1885.

Mr. Scott was instructed to reply that the Council would reserve their opinion until the proposed conference on the subject of the general adoption of Greenwich time had been held at Washington.

Submitted—An estimate (Letter 27) from Messrs. Dangerfield for the cost of illustrations to Mr. Abercromby's "Principles of Weather Forecasting" (Minutes, p. 28), which was—

	£	s.	d.
For lithography - - - -	45	0	0
For production of zinc blocks - - -	44	10	0

Mr. Scott was instructed to request Mr. Abercromby to reduce the number of diagrams, so that the cost should not exceed 50*l.*

Read—Letter No. 2648 from Dr. Neumayer, requesting that observations from the South Atlantic might be supplied to him for proposed daily synoptic charts of that ocean.—Sanctioned.

Mr. Scott reported that he had been requested to act on a Meteorological Sub-Committee of the proposed International Health Exhibition, and had consented, with the Chairman's sanction, to act.—Approved. Mr. Scott was authorised to apply for space for the exhibition of diagrams and apparatus bearing on climatology, &c.

Submitted the following statements of work for December 1883 :—

MARINE ROOM.

January 9, 1884.

Examined 7 new logs and 8 lighthouse registers.

North Atlantic Weather Charts.

Sea isotherms for August 1882 completed.

Considerable progress made with the drawing of isobars and isotherms for September 1882. Also with the preparation and plotting of sea and land observations for the remaining months.

Two reduced charts for August 24, 1882, traced by eidograph, one for barometer, the other for air and sea temperatures,—scale ¼th of original.

The despatch of forms to captains of ships somewhat curtailed. All forms received have been acknowledged, and a fresh supply of forms forwarded.

A clerk engaged about one-half of his time visiting ships arriving in London to extract from their logs such observations as they contain, for the work.

General.

Making a diagram of barometer observations recorded in Meteorological Office logs of H.M.S. "Flying Fish" and H.M.S. "Magpie," with the object of detecting any influence of the volcanic eruption of Krakatoa.

Diagrams drawn illustrating the general circulation of the atmosphere, for insertion in the Barometer Manual.

(Signed) CHAS. HARDING.
H. T.

The Marine Superintendent.

TELEGRAPHIC (FORECAST AND STORM WARNINGS) BRANCH.

Checking Accuracy of the Hay Harvest Forecasts, 1883.—Completed, and results handed in.

Preparing Means of the Temperature of Evaporation at 8 a.m. for all the Telegraphic Reporting Stations, for each month, during the 10 years 1871 to 1880.—Completed, and results brought into use.

Preparing Monthly Weather Reports (specimen copies) for prompt issue.—November, completed and handed in ; *December,* work kept up to date. The mean values for the month are being calculated.

Revising and adding to Weekly Weather Report, increasing size and number of the Charts, and preparing for the insertion of Accumulated Temperature, Rainfall and Sunshine.—In progress, apparently half done.

Revising Daily Weather Report, altering to quarto size, adding new Values, &c.—Completed, and carried through press.

The Christmas holidays (three days for each clerk) have been taken during this month.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

December 31, 1883.

Quarterly Weather Report.—The text for the third quarter of 1876 is completed, and the tables of cyclonic and anticyclonic systems are in progress and alone remain to complete the quarter. The charts for the fourth quarter are nearly completed, ready for pantagraphing.

Specimen plates of rainfall curves, showing frequency and amount of fall, have been prepared.

A great deal of time has been spent in connexion with the tabulation, &c. of barograms for last August.

The harmonic analysis of the temperature curves for 1877 has been completed for five stations, and the sixth is in hand ; during the month the various adjustments of the instrument have been examined and verified.

Mr. Cobley has been absent on special sick leave all the month. C. Bracey has been almost wholly employed on work for the Computing Room, and L. Powers was similarly employed till the 6th, when his right hand was injured whilst printing diagrams of the August barometric oscillations.

(Signed) R. H. CURTIS.

EXAMINATION ROOM.

SIR, January 1, 1884.

The following *Curves* and *Tabulations* have been examined :—May (1882), *Anemograms,* two stations.

June (1882), *Thermograms,* six stations ; *Barograms,* three stations.

The daily rainfall at Kew for August to October 1883, and the hourly observations of the various instruments at six of the observatories, for the 10th and 12th of December 1883, have been examined and supplied, as also such portion of the October 1883 work of Valencia and Armagh required for the Report of the Registrar General of Ireland.

The Christmas holidays have also interfered with the work of examination during the month.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S., (Signed) T. E. ALLEN.
Secretary, Meteorolgical Council.

Reported—That the following cheques have been drawn during the month of December, including quarterly allowances to observers :—

1883.		£ s. d.	£ s. d.
1st Dec.	For weekly salaries	- -	29 11 11
8th „	Do.	- -	29 11 11
15th „	Do.	- -	29 11 11
„ „	G. A. Gillett, wood, oil, &c.	- -	2 17 5
„ „	Pall Mall Coal Co., coals	- -	9 12 0
„ „	Johnson, Matthey, & Co., chemicals	- -	2 12 8
20th „	C. E. Strachan, Arctic work (Minutes, May 10)	- -	2 6 6
„ „	T. Harris & Son, exhibition case	- -	7 0 0
„ „	B. Edgington, signal cones	- -	7 7 0
„ „	Postmaster-General, telegrams	- -	427 17 4
„ „	R. H. Scott, inspections	- -	11 16 7
„ „	F. Dangerfield, commissions	- -	7 5 0
„ „	R. W. Munro, „	- -	108 16 4
22nd „	For weekly salaries	- -	28 11 11
29th „	Do.	- -	28 11 11
31st „	R. H. Scott, salary	- -	66 13 4
„ „	J. S. Harding, jun., salary	- -	27 15 6
„ „	T. D. Bell „	- -	14 8 10
„ „	C. W. Jacques, rent	- -	158 15 0
„ „	J. S. Harding, sen., pension	- -	10 14 1
„ „	W. Thomas, care of Scilly anemometer	1 13 7	
„ „	Do. meteorological reports	*8 1 9	
			9 15 4
„ „	H. Williams, care of bridled anemometer	2 11 0	
„ „	Do. do. Robinson's „	2 13 4	
			5 4 4
„ „	C. Niven, Aberdeen Observatory	- -	67 19 9
„ „	J. L. E. Dreyer, Armagh „	- -	61 4 8
„ „	W. L. Fox, Falmouth „	- -	60 19 4
„ „	R. Grant, Glasgow „	- -	69 4 0
„ „	Kew Committee, allowance	100 0 0	
„ „	Do. postages and waxed paper	2 1 3	
			102 1 3
„ „	C. Clouston, Orkney	- -	2 19 3
„ „	G. H. Aird, Seaham	- -	2 13 10
„ „	S. J. Perry, Stonyhurst Observatory	- -	56 15 6
„ „	J. E. Cullum, Valencia „	38 5 3	
„ „	Do. salary	16 13 4	
			54 18 7
„ „	G. T. Watson, care of anemometer, Yarmouth	4 19 5	
„ „	Do. meteorological reports	*7 11 10	
			12 11 3
„ „	S. Call, Armagh, gratuity (Minutes, November 29, 1883)		75 0 0
„ „	J. O'Driscoll, rent at Valencia	- -	25 0 6
„ „	R. H. Curtis		22 4 5
„ „	J. A. Curtis		16 3 7
„ „	T. E. Allen		15 11 1
„ „	C. H. Thompson	Discussion, &c. of observations -	11 3 4
„ „	H. N. Cobley		10 5 11
„ „	E. G. Aldridge		†9 15 10
„ „	J. McCormack, Aberdeen (bonus)	- -	3 3 0
„ „	J. W. Mayes, Ardrossan („)	- -	3 3 0
„ „	H. Todd, Cambridge	- -	*7 19 0
„ „	H. Mohn, Christiania	- -	5 10 0
„ „	T. MacGowan, Donaghadee (bonus)	- -	3 3 0
	Carried forward	- -	£1,725 17 9

* Including a bonus of 3*l.* 3*s.*

† Five weeks ending 29th December.

Office

			£	s.	d.	£	s.	d.
1883.		Brought forward -	-		-	1,725	17	9
31st Dec.	J. Costello, Dover - - -		-		-	*7	1	6
„ „	W. Brand, Dunrossness - - -		-		-	*7	1	5
„ „	W. Foster, Hawes Junction - -		-		-	*7	1	3
„ „	G. Jones, Holyhead - - -		-		-	3	18	0
„ „	G. G. Appleton, Hurst Castle - -		-		-	*7	5	6
„ „	J. Fisher, Jersey - - - -		-		-	*7	8	6
„ „	F. Gaster - - - - -		-		-	*7	1	0
„ „	W. Berridge, Loughborough - -		-		-	*6	8	10
„ „	K. Kerr, Mullaghmore - - -		-		-	*8	8	10
„ „	W. D. Penny, Nairn - - -		-		-	*7	7	6
„ „	J. W. Irvine, N. Shields (bonus) -		-		-	3	3	0
„ „	W. Wickham, Oxford - - -		-		-	*6	15	9
„ „	G. Phillips, Parsonstown - -		-		-	*6	10	6
„ „	J. John, Prawle Point - - -		-		-	*6	8	0
„ „	W. Kennedy, Roche's Point (bonus)		-		-	3	3	0
„ „	S. Blake, St. Ann's Head - -		-		-	*6	11	6
„ „	J. B. Smith, Spurn Head - -		-		-	*6	10	7
„ „	D. Macdonald, Stornoway - -		-		-	*8	14	0
„ „	J. Sinclair, Wick - - - -		-		-	*6	8	0
„ „	A. Guy, York - - - - -		-		-	3	18	0
„ „	F. Gaster -	Preparation, &c. of Weather Reports -				31	14	4
„ „	F. J. Brodie -					20	10	0
„ „	G. G. Francis -					20	12	10
„ „	A. J. Rigby -					15	0	0
„ „	R. Sargeant -					13	11	3
„ „	A. Buchan, salary - - -		-		-	37	10	0
„ „	W. C. Ley „ - - -		-		-	37	10	0
„ „	Capt. H. Toynbee - - -	Discussion, &c. of observations and care of instruments.				33	6	8
„ „	Nav. Lieut. C. W. Baillie, R.N. -					20	16	8
„ „	R. Strachan - - -					27	15	6
„ „	C. Harding - - -					22	4	5
„ „	H. Harries - - -					13	6	8
„ „	W. Allingham - - -					13	6	8
„ „	W. G. James - - -					9	12	0
„ „	J. Fowler, Cardiff agent - -		-		-	9	2	0
„ „	L. Allen, Dundee „ - -		-		-	2	10	9
„ „	J. Gill, Liverpool „ - -		-		-	20	18	7
„ „	C. H. Permain, Southampton agent		-		-	5	6	3
„ „	C. Adie, repairing A. barometers -		-	40	11	0		
„ „	„ „ B. T. „ -		-	11	15	9		
„ „	„ eidograph and fittings -		-	15	5	0		
							67	11	9
„ „	W. Allingham, collection of synchronous observations				-	2	17	0
„ „	R. Riviere and Son, labels for charts		-		-	2	14	0
„ „	R. J. Lecky, commissions - -		-		-	3	5	0
„ „	J. S. Harding, junr., petty cash -		-		-	50	0	0
						£2,334	14	9

Mr. Galton submitted the following memorandum :—

Mr. Galton, referring to the regular rate of transmission of small barometric oscillations, exemplified by those occasioned by the volcanic outburst at Krakatoa, recently discussed by General Strachey, proposed the repetition of experiments to ascertain whether the existence of distant storms might not be discovered by minute peculiarities of barometric oscillations imperceptible in ordinary barometers, as has been stated by several investigators; also the locality, rate, and direction of progress of the storms by the differences in time at which any recognised oscillations may have reached three or more stations widely apart, whence the differences in distance of the source of oscillations would be known, and consequently its actual distance and direction. He

* Including a bonus of 3*l.* 3*s.*

suggested that the means of registering minute oscillations should be by a chain of numerous vacuum (aneroid) boxes, hung from a fixed point above, and stretched downwards by the pull of a spring attached to another fixed point below. The range of movement of the end of the chain pulled by the spring would be equal to that of a solitary vacuum box multiplied by the number of boxes in the chain. It would follow that by using a sufficiently long chain of vacuum boxes, almost any degree of delicacy of registration could be attained. He had consulted Messrs. Légé, and found that an experimental instrument would be far from costly. He proposed that one should be made with a chain of 60 large vacuum boxes, requiring a strain of 40 lbs. or thereabouts to extend them, and that the oscillations should be measured during short periods only, on a method similar to that employed by physiologists, of light scratches by a point at the end of a long lever, pressing very lightly against smoked paper on a revolving drum.

Resolved—That Mr. Galton be authorised to expend a sum not exceeding 15*l*. on an experimental barograph for minute variations of pressure, as proposed by him.

116, *Victoria Street, January* 23, 1884.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 9) were read and confirmed.

Read—Letters 165 and 208 from the Rev. S. J. Perry, F.R.S., of Stonyhurst, stating that the annual cost of paper, &c. for the duplicate photographic records as requested by the Council (Minutes, p. 87) would be 6*l.*

Resolved—That the grant to Stonyhurst Observatory be increased by 6*l.* (P.C. 201).

Mr. Galton reported that he had had an interview with Mr. W. H. Preece relative to electrical anemometers, and he submitted a letter (No. 227) from that gentleman expressing his readiness to fit up such an instrument at a cost not exceeding 25*l.*

Mr. Scott was instructed: (1.) To have the portions of the anemograph in the Office set in order and sent to Mr. Preece.

(2.) To order an anemograph of the ordinary pattern for Valencia Observatory (Minutes, p. 57).

The specimen Monthly Weather Report for November 1883 (Minutes, p. 81) was generally approved, with some verbal corrections.

Read—Letter 141 from Mr. Abercromby, stating that he had reduced the number of diagrams in his draft MS. on "The Principles of Weather Forecasting" (Minutes, p. 94) by 65, so that the cost of the whole ought not, according to the estimate, to exceed 50*l.*

Mr. Scott was authorized to have the matter set up in type, and the illustrations put in hand, the Office paying for them if the Stationery Office cannot undertake them.

With reference to Mr. Ley's report on the advisability of making Dungeness a reporting station (Minutes, p. 94), Mr. Scott was instructed to inquire specifically as to possible arrangements at Dungeness.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 10 logs had been received, eight of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. R. J. Balderston	"Belfast" -	April 25—Dec. 25, 1883.	Liverpool, Calcutta, and home.	1877, p. 21.
Capt. T. England -	Barque "Jane"	Oct. 2, 1883—Jan. 12, 1884.	Liverpool to Apalachicola, and home.	—
Capt. C. M. Hepworth.	S.S. "Danube" -	April 29—Dec. 8, 1883.	Cape and South African Coast.	1883, p. 4.
Lieut. Com. R. F. Hoskyn, Lieut. H. Baker.	H.M.S. "Flying Fish."	Oct. 1 — Nov. 8, 1883.	Surveying China Seas -	1883, p. 82.
Capt. C. Lehman -	Barque "Mikado."	Dec. 13, 1882 — Dec. 27, 1883.	London, Swan River, China, and home.	1882, p. 42.
Lieut.-Com. C. F. Oldham, Lieut. A. Leeper.	H.M.S. "Lark"	Feb. 6 — June 9, 1883.	Surveying Solomon Islands	1883, p. 4.
Capt. Jas. Pagan -	S.S. "Tenasserim"	Oct. 16, 1883—Jan. 15, 1884.	Liverpool, Rangoon, and home.	—
Capt. A. M'Lean Wait.	S.S. "Spartan" -	July 27—Dec. 27, 1883.	Two voyages to the Cape	—

Mr. Scott was instructed to present the charts (O. 27) to Captains England, Pagan, and Wait, and to convey the best thanks of the Council to the other observers.

Submitted—The following statement of accounts for nine months ending 31st December 1883 :—

Income.	£ s. d.	£ s. d.
Balance from year 1882–3		883 15 1
Proportion of vote for nine months		11,475 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	17 19 9	
(2.) Special researches	20 7 6	
(3.) Observatories and stations	35 1 8	
		73 8 11
Supply of Weather Information :		
D.W. charts and forecasts	189 14 10	
6 p.m. charts	18 15 0	
Information for Press Agencies, &c.	70 19 3	
Telegrams	141 19 1	
Miscellaneous data	17 6 8	
		438 14 10
Sale of Instruments, &c. :		
Mercantile Marine account	50 10 7	
Royal Navy	28 14 6	
		79 5 1
Commission charged on work done for Colonies, &c.		38 5 3
		£12,988 9 2

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council	750 0 0	
Secretary	600 0 0	
Salaries and wages	555 8 0	
Rent, fuel, and lighting	536 2 1	
Furniture and fittings	84 9 8	
Incidental and contingent expenses	325 2 3	
Expenses contingent on Meteorological Congress	5 11 3	
Pensions	32 2 3	
		2,888 15 6
Special Researches		453 17 6
Land Meteorology :		
Observatories and stations	1,967 6 0	
Discussion and reduction of observations	991 13 3	
		2,958 19 3
Weather Information and Forecasts :		
Telegraphic reports and storm warnings	2,376 16 7	
Preparation and issue of reports and forecasts	1,104 2 0	
		3,480 18 7
Inspections :		
Salaries and travelling expenses		397 10 9
Ocean Meteorology :		
Discussion and reduction of observations	1,264 3 9	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments	200 0 0	
Royal Navy	166 8 8	
Mercantile Marine	438 1 1	
Distant island and coast stations	28 0 0	
		2,096 13 6
Balance		711 14 1
		£12,988 9 2

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	750 0 0	By cash at Bank	402 14 0
,, sundry creditors	927 4 10	,, ,, at Office	85 11 0
,, balance	711 14 1	,, ,, at Valencia	50 0 0
		,, sundry debtors	375 13 11
		,, H. M. Exchequer	1,475 0 0
	£2,388 18 11		£2,388 18 11

116, *Victoria Street, February* 6, 1884.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 23) were read and confirmed.

Submitted—The following report:—

SIR, February 6th, 1884.

I BEG to hand you herewith the results of the analysis of the temperature curves of the seven observatories for the years 1872 to 1877.

The curves for the years 1871 and 1872 were analysed by the late Mr. Burton, and the constants for 1871 are not yet calculated; I have thought it advisable to re-analyse the Valencia curves for the year, as, owing to its being the earliest set worked, the method followed with them differed somewhat from that subsequently used, and Mr. Sheerman is now engaged upon the work.

The papers I now hand to you comprise the readings of the cylinders as well as the constants calculated therefrom.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) R. H. CURTIS.

Professor Stokes was requested to consider the subject of the most advisable form of publication of the results.

Mr. Scott submitted the records of the bridled anemometer at Holyhead during the recent storm (January 26th), and asked for instructions as to their tabulation.

Professor Stokes was requested to give instructions to Mr. H. Williams for experiments to test the scale value of the instruments.

Mr. Scott was instructed to issue the Monthly Weather Report (Minutes, p. 64), if possible within five weeks from the expiration of the month.

Read—A memorandum from Captain Toynbee reporting that since the last meeting four logs had been received, two of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Scott	Barque "Commewyne."	July 2, 1883—Jan. 10, 1884.	Glasgow, Surinam, and home.	1883, p. 38.
Staff. Com. T. H. Tizard.	H.M.S. "Triton"	April 14—Oct. 30, 1883.	Surveying on East Coast of British Isles.	1882, p. 85.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Read—An application from Mr. Stevens, telegraphist, for an increase of pay, as his time is not fully occupied, and he has leisure to do other work besides telegraphy (Letter 1276, 1883).

Mr. Scott reported that Mr. Stevens had been allowed to do copying work at his leisure time since the beginning of November, and had done it satisfactorily.

Resolved—That Mr. Stevens have an increase of 3*s.* per week, to date from November 1, 1883, on the understanding that he continues to work at other business besides telegraphy at spare time.

Read—Letter (No. 345) from Mr. Simpkins, applying for an increase of salary. The Council saw no reason to grant this request.

Submitted—The following reports on the forecasts for the months of April, May, and June 1883 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

APRIL, 1883.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	44	48	46	72
,,	b	32	20	26	
,,	c	20	12	16	
,,	d	4	20	12	
Scotland, E.	a	36	44	40	72
,,	b	24	40	32	
,,	c	24	4	14	
,,	d	16	12	14	
England, N.E.	a	24	52	38	68
,,	b	28	32	30	
,,	c	28	16	22	
,,	d	20	0	10	
England, E.	a	40	52	46	74
,,	b	32	24	28	
,,	c	12	8	10	
,,	d	16	16	16	
Midland Cos.	a	32	52	42	64
,,	b	24	20	22	
,,	c	28	16	22	
,,	d	16	12	14	
England, S.	a	28	52	40	70
,,	b	32	28	30	
,,	c	16	8	12	
,,	d	24	12	18	
Scotland, W.	a	24	48	36	68
,,	b	40	24	32	
,,	c	24	16	20	
,,	d	12	12	12	
England, N.W.	a	40	52	46	82
,,	b	36	36	36	
,,	c	8	4	6	
,,	d	16	8	12	
England, S.W.	a	24	56	40	78
,,	b	48	28	38	
,,	c	20	8	14	
,,	d	8	8	8	
Ireland, N.	a	24	40	32	68
,,	b	32	40	36	
,,	c	28	4	16	
,,	d	16	16	16	
Ireland, S.	a	20	48	34	68
,,	b	36	32	34	
,,	c	24	4	14	
,,	d	20	16	18	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	53	60	57	84
,,	b	37	17	27	
,,	c	7	7	7	
,,	d	3	16	9	
Scotland, E.	a	63	57	60	92
,,	b	27	37	32	
,,	c	0	3	2	
,,	d	10	3	6	
England, N.E.	a	47	50	49	77
,,	b	33	23	28	
,,	c	17	27	22	
,,	d	3	0	1	
England, E.	a	57	50	54	84
,,	b	27	33	30	
,,	c	3	7	5	
,,	d	13	10	11	
Midland Cos.	a	53	43	48	75
,,	b	27	27	27	
,,	c	7	27	17	
,,	d	13	3	8	
England, S.	a	43	50	47	80
,,	b	27	40	33	
,,	c	7	7	7	
,,	d	23	3	13	
Scotland, W.	a	27	44	36	76
,,	b	47	33	40	
,,	c	13	10	11	
,,	d	13	13	13	
England, N.W.	a	37	60	49	87
,,	b	47	30	38	
,,	c	3	3	3	
,,	d	13	7	10	
England, S.W.	a	30	54	42	82
,,	b	40	40	40	
,,	c	20	3	12	
,,	d	10	3	6	
Ireland, N.	a	30	60	45	76
,,	b	44	17	31	
,,	c	13	7	10	
,,	d	13	16	14	
Ireland, S.	a	44	57	51	79
,,	b	33	23	28	
,,	c	10	3	6	
,,	d	13	17	15	

SUMMARY.

British Isles	a	31	50	41	72
,,	b	33	29	31	
,,	c	21	9	15	
,,	d	15	12	13	
British Isles	a	44	53	49	81
,,	b	35	29	32	
,,	c	9	10	9	
,,	d	12	8	10	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

MAY, 1883.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	33	59	46	83
,,	b	48	26	37	
,,	c	11	11	11	
,,	d	8	4	6	
SCOTLAND, E.	a	41	44	43	78
,,	b	44	26	35	
,,	c	4	11	7	
,,	d	11	19	15	
ENGLAND, N.E.	a	44	37	41	74
,,	b	33	33	33	
,,	c	19	4	11	
,,	d	4	26	15	
ENGLAND, E.	a	29	63	46	91
,,	b	63	26	45	
,,	c	4	7	5	
,,	d	4	4	4	
MIDLAND COS.	a	41	48	45	87
,,	b	48	37	42	
,,	c	4	8	6	
,,	d	7	7	7	
ENGLAND, S.	a	59	48	54	91
,,	b	30	45	37	
,,	c	7	0	4	
,,	d	4	7	5	
SCOTLAND, W.	a	48	44	46	80
,,	b	41	26	34	
,,	c	7	15	11	
,,	d	4	15	9	
ENGLAND, N.W.	a	52	56	54	78
,,	b	33	15	24	
,,	c	8	18	13	
,,	d	7	11	9	
ENGLAND, S.W.	a	52	52	52	80
,,	b	22	33	28	
,,	c	15	11	13	
,,	d	11	4	7	
IRELAND, N.	a	59	56	58	85
,,	b	33	22	27	
,,	c	4	11	8	
,,	d	4	11	7	
IRELAND, S.	a	48	52	50	85
,,	b	37	33	35	
,,	c	8	11	10	
,,	d	7	4	5	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	55	58	57	84
,,	b	35	19	27	
,,	c	10	13	11	
,,	d	0	10	5	
SCOTLAND, E.	a	61	52	57	78
,,	b	29	13	21	
,,	c	7	16	11	
,,	d	3	19	11	
ENGLAND, N.E.	a	68	52	60	85
,,	b	23	26	25	
,,	c	0	6	3	
,,	d	9	16	12	
ENGLAND, E.	a	49	39	44	81
,,	b	42	32	37	
,,	c	3	26	15	
,,	d	6	3	4	
MIDLAND COS.	a	58	42	50	82
,,	b	32	32	32	
,,	c	3	16	10	
,,	d	7	10	8	
ENGLAND, S.	a	58	45	52	89
,,	b	36	39	37	
,,	c	3	6	5	
,,	d	3	10	6	
SCOTLAND, W.	a	52	45	49	83
,,	b	42	26	34	
,,	c	3	19	11	
,,	d	3	10	6	
ENGLAND, N.W.	a	52	45	49	76
,,	b	35	19	27	
,,	c	10	23	16	
,,	d	3	13	8	
ENGLAND, S.W.	a	58	42	50	86
,,	b	32	39	36	
,,	c	7	10	8	
,,	d	3	9	6	
IRELAND, N.	a	55	49	52	88
,,	b	26	45	36	
,,	c	6	6	6	
,,	d	13	0	6	
IRELAND, S.	a	58	45	52	86
,,	b	26	42	34	
,,	c	3	7	5	
,,	d	13	6	9	

SUMMARY.

BRITISH ISLES	a	46	51	49	83
,,	b	39	29	34	
,,	c	8	10	9	
,,	d	7	10	8	
BRITISH ISLES	a	57	47	52	83
,,	b	32	30	31	
,,	c	5	13	9	
,,	d	6	10	8	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JUNE, 1883.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	54	50	52	89
,,	b	27	46	37	
,,	c	19	4	11	
,,	d	0	0	0	
Scotland, E.	a	38	54	46	90
,,	b	50	38	44	
,,	c	8	4	6	
,,	d	4	4	4	
England, N.E.	a	38	46	42	82
,,	b	42	38	40	
,,	c	8	8	8	
,,	d	12	8	10	
England, E.	a	54	38	46	71
,,	b	31	19	25	
,,	c	8	35	22	
,,	d	7	8	7	
Midland Cos.	a	50	35	43	75
,,	b	27	38	32	
,,	c	19	12	16	
,,	d	4	15	9	
England, S.	a	58	46	52	77
,,	b	26	23	25	
,,	c	12	19	15	
,,	d	4	12	8	
Scotland, W.	a	35	38	37	81
,,	b	38	50	44	
,,	c	19	8	13	
,,	d	8	4	6	
England, N.W.	a	46	42	44	79
,,	b	35	35	35	
,,	c	15	12	14	
,,	d	4	11	7	
England, S.W.	a	39	46	43	75
,,	b	38	27	32	
,,	c	19	15	17	
,,	d	4	12	8	
Ireland, N.	a	62	50	56	87
,,	b	23	38	31	
,,	c	15	12	13	
,,	d	0	0	0	
Ireland, S.	a	50	39	45	81
,,	b	35	38	36	
,,	c	11	12	12	
,,	d	4	11	7	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	43	50	47	92
,,	b	50	40	45	
,,	c	7	7	7	
,,	d	0	3	1	
Scotland, E.	a	57	50	54	87
,,	b	37	30	33	
,,	c	3	3	3	
,,	d	3	17	10	
England, N.E.	a	48	57	53	87
,,	b	45	23	34	
,,	c	7	7	7	
,,	d	0	13	6	
England, E.	a	55	37	46	85
,,	b	38	40	29	
,,	c	7	10	9	
,,	d	0	13	6	
Midland Cos.	a	48	50	49	77
,,	b	35	20	28	
,,	c	17	17	17	
,,	d	0	13	6	
England, S.	a	52	44	48	82
,,	b	34	33	34	
,,	c	14	10	12	
,,	d	0	13	6	
Scotland, W.	a	40	57	49	87
,,	b	40	37	38	
,,	c	17	3	10	
,,	d	3	3	3	
England, N.W.	a	53	50	52	82
,,	b	37	24	30	
,,	c	10	13	12	
,,	d	0	13	6	
England, S.W.	a	45	47	46	78
,,	b	41	23	32	
,,	c	7	13	10	
,,	d	7	17	12	
Ireland, N.	a	48	60	54	85
,,	b	38	24	31	
,,	c	4	13	9	
,,	d	10	3	6	
Ireland, S.	a	62	37	50	80
,,	b	21	40	30	
,,	c	10	13	12	
,,	d	7	10	8	

SUMMARY.

British Isles	a	48	44	46	81
,,	b	34	35	35	
,,	c	14	13	13	
,,	d	4	8	6	

British Isles	a	50	49	50	84
,,	b	38	30	34	
,,	c	9	10	9	
,,	d	3	11	7	

Submitted—The following statements of work for January 1884:—

MARINE ROOM.

February 4, 1884.

Examined 17 new logs.

North Atlantic Weather Charts.

The first drawing of air and sea isotherms for September 1882 completed. Isobars for the same month well advanced.

Air and sea isotherms for October 1882 commenced.

Progress made with the preparation of sea and land observations.

The original working chart extended northwards (to 79° N. in 40° W.), so as to show several of

the circumpolar observing stations. By means of the eidograph a reduction of this enlarged chart to ¼th of its scale has been drawn for the preparation of a copper-plate key chart.

Receipt of forms acknowledged and fresh supply made to captains.

A clerk engaged for about three weeks in London and Liverpool collecting data from ships arriving in port.

General.

Adding the observations made on the S.S. "Scotia" to a diagram showing the barometric oscillations at the period of the Krakatoa eruption.

Copying the Arctic meteorological observations made by Mr. Leigh Smith during the expedition of the "Eira."

(Signed) CHAS. HARDING.
H. T.

The Marine Superintendent.

TELEGRAPHIC (Forecast and Storm Warnings) BRANCH.

Preparation of Monthly Weather Report:—

November 1883.—Printed (except maps), revised, approved, and put on one side for future publication.

December 1883.—Tables of cyclones and anticyclones, means of pressure, temperature, and wind, all prepared. Weather charts drawn in rough. Finishing of the work then delayed, till the Council had decided as to whether the November Report met with their approval.

January 1884.— Kept as nearly as possible to date, but some northern reports are still wanting before the last of the depressions can be summarised. The means of pressure, temperature, &c. are in hand. It is hoped that the "copy" will be ready for the printer by 12th or 13th.

Weekly Weather Report is now being issued in its enlarged form. Calculation of "accumulated" values for several past years is being arranged for.

Arrears of Forecast checking.—In hand (three months reports herewith) and being picked up rapidly.

Preparing Tables of Averages for Quarterly Weather Report, Part I., 1877.—In hand; about one fourth done.

During this month I have, with special permission, been absent from the Office on four days, owing to a death and very much sickness in my family.

(Signed) FREDC. GASTER.

January 31, 1884.

PANTAGRAPH ROOM.

Quarterly Weather Report:—

Part III., 1876.—The tables for the third part of 1876 have been completed and the whole of the letterpress, with the charts, &c., is now in the hands of the printer.

Part IV., 1876.—The gale tables have been finished, the charts of mean monthly pressure and temperature drawn, and the general summary of the weather nearly completed. The daily charts of isobars have been finished, and chart plates 16, 17, and 18 pantagraphed; these plates are being etched, &c. by me.

Harmonic Analyser.—The analysis of the temperature curves for 1877 has been completed, and the constants for the years 1872, 1874, and 1877 worked out. The figures for 1871 left by Mr. Burton are in a somewhat confused state, and it has been found necessary to analyse again the curves for Valencia; this work is now in hand.

Copies of all the tabulations, &c. from Glasgow and Aberdeen for several days in November and December were made and sent to Mr. Buchan.

A return of daily amounts of sunshine at Bunhill Row has been made for the Royal Meteorological Society.

A little time has been taken up with the barometrical oscillation of last August.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

February 1, 1884.

EXAMINATION ROOM.

SIR,

THE following *Curves* and *Tabulations* have been examined during the month of January 1884:—June (1882); *Barograms*, four stations; *Anemograms*, six stations.

July (1882): *Thermograms*, five stations; *Barograms*, three stations.

Also such portion of the *November* and *December* (1883) work of Valencia and Armagh required for the Report of the Registrar General of Ireland.

I am, &c.
(Signed) T. E. ALLEN.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Council.

Reported—That the following cheques have been drawn during the month of January:—

1884.		£	s.	d.
5th January.	For weekly salaries	28	11	11
12th „	Wightman & Co., special printing	2	7	6
„ „	Pickford & Co., carriage of parcels	3	15	6
„ „	F. Dangerfield, delivery of D.W. charts, &c.	11	13	3
„ „	J. J. Hicks, instruments	35	6	10
„ „	D. Macgregor & Co., Glasgow agents	15	0	0
„ „	Z. Scaping, Hull agents	1	7	6
„ „	Kew Committee, verifications, &c.	25	4	0
„ „	For weekly salaries	28	11	11
19th „	„ „	28	11	11
„ „	Gas Company, gas	8	0	1
„ „	H. Bond & Son, office repairs, &c.	47	14	8
„ „	F. Gaster, attendance at Liverpool	4	16	0
„ „	Johnson, Matthey, & Co., chemicals	2	12	8
„ „	Postmaster-General, telegrams	197	17	7
„ „	Royal Meteorological Society, weekly reports	5	0	10
„ „	H. Porter, commissions	31	0	0
26th „	For weekly salaries	28	11	11
„ „	Kew Committee, researches with actinometer and cloud camera (Minutes, December 6, 1882, and Letter M.O. 1023, 1883)	19	0	7
„ „	C. E. Strachan, Arctic work (Minutes, May 10)	3	10	6
„ „	R. Strachan, attendance at Law Courts, &c.	2	13	0
„ „	Negretti and Zambra, instruments and repairs	81	4	2
„ „	W. Allingham, collection of synchronous observations	9	3	5
„ „	J. Pattison, hygrometer glasses	2	10	8
31st „	R. H. Scott, salary	66	13	4
„ „	J. S. Harding, jun., salary	27	15	6
„ „	T. D. Bell, salary	14	8	10
„ „	J. E. Cullum (Valencia), salary	16	13	4
„ „	R. H. Curtis — Discussion, &c. of observations.	22	4	5
„ „	J. A. Curtis — Discussion, &c. of observations.	16	3	7
„ „	T. E. Allen — Discussion, &c. of observations.	15	11	1
„ „	C. H. Thompson — Discussion, &c. of observations.	11	3	4
„ „	H. N. Cobley — Discussion, &c. of observations.	10	5	11
„ „	E. G. Aldridge — Discussion, &c. of observations.	7	16	8
„ „	F. Gaster — Preparation, &c. of Weather Reports.	30	4	0
„ „	F. J. Brodie — Preparation, &c. of Weather Reports.	20	1	6
„ „	G. G. Francis — Preparation, &c. of Weather Reports.	19	13	0
„ „	A. J. Rigby — Preparation, &c. of Weather Reports.	15	0	0
„ „	R. Sargeant — Preparation, &c. of Weather Reports.	13	5	9
„ „	Capt. H. Toynbee — Discussion, &c. of observations and care of instruments.	33	6	8
„ „	Nav. Lieut. C. W. Baillie, R.N. — Discussion, &c. of observations and care of instruments.	20	16	8
„ „	R. Strachan — Discussion, &c. of observations and care of instruments.	27	15	6
„ „	C. Harding — Discussion, &c. of observations and care of instruments.	22	4	5
„ „	H. Harries — Discussion, &c. of observations and care of instruments.	13	6	8
„ „	W. Allingham — Discussion, &c. of observations and care of instruments.	13	6	8
„ „	W. G. James — Discussion, &c. of observations and care of instruments.	9	12	0
„ „	E. Higgs, office repairs, &c.	22	19	9
„ „	Paymaster-General, sale of Stationery Office forms	4	0	9
„ „	J. S. Harding, jun., petty cash	50	0	0
		£1,148	15	9

116, *Victoria Street, February* 19, 1884.

PRESENT:
LIEUT.-GENERAL STRACHEY IN THE CHAIR.
PROFESSOR STOKES. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 6) were read and confirmed.

Read—The following letter (Minutes, p. 88):—

(M.O. 429.)

DEAR MR. SCOTT, Falmouth, February 16, 1884.

THE purchase of the selected site having been arranged with Earl Kimberley, I send you a tracing showing its position and extent; you will observe that if ever houses are built near (of which there is no immediate prospect), it will be bounded by roads, all but one of which will be 50 feet wide. The distance of the nearest tree to the proposed site of the rain gauge (marked R. G.) is about 150 feet.

I shall feel obliged by your kindly obtaining the approval of the Council to your report as early as convenient, and by your favouring me with a copy thereof, and of the minute relating thereto.

On obtaining these, the necessary arrangements can at once be made for the erection of the building, as the Committee is anxious to lose no time.

I remain, &c.
(Signed) WILSON L. FOX.

Resolved—That the site for the Falmouth Observatory, proposed in Mr. Fox's letter of the 16th instant, and described in Mr. Scott's report (Minutes, January 9) is satisfactory. Mr. Scott was instructed to communicate this resolution to Mr. Fox (Letter 431).

Mr. Scott reported that on the 15th ultimo a circular had been issued by the Press Association, Limited, stating that they received the only telegraphic reports from Ben Nevis Observatory, and would receive subscriptions for the supply of the information, and that on the 31st ultimo he had received a letter (No. 288) from Mr. Buchan stating that an engagement had been made between the Directors of the Ben Nevis Observatory and the Press Association.

He had at once inquired of Mr. Buchan (Letter 273) whether this agreement in any way interfered with the arrangements for the receipt by the Office of telegraphic information from Ben Nevis, and had received a reply (Letter 440) to the effect that it did not in any way so interfere.

Mr. Scott was instructed to request the Press Association to explain the statements in their circular (P.C. 434).

Professor Stokes submitted the following Memorandum:—

RESULTS obtained by the APPLICATION of the HARMONIC ANALYSER to the PHOTOGRAPHIC RECORDS of the BAROMETER.

In relation to this subject two distinct questions present themselves: First, how far may the instrument be trusted to give the coefficients in the harmonic expression for the height, regarded as a periodic function of the time, superseding thereby the laborious process of measuring a great number of ordinates and calculating the coefficients numerically? Secondly, how far do the coefficients obtained in either of these ways represent a true periodic inequality, as distinguished from the mere unelimnated residues of non-periodic fluctuations?

1. The instrument has hitherto been applied to the diurnal variation in the different months. Its accuracy for eliciting this feature, so delicate a one in our latitudes, has been tested in the following manner:—

The height of the barometer for each month of the year 1876, and for each of the seven self-recording observatories, has been expressed as a function of the time of day in a harmonic series to three orders, by numerical calculation in the usual way, from the data furnished by the hourly means calculated by Mr. Eaton. The coefficients got in this manner show a very close agreement with those obtained by means of the machine. The coefficients of the variable terms, which have been calculated to four places of decimals, agree so well that the average difference is only about the thousandth of an inch. The comparison does not furnish the means of forming a judgment which of the two sets of numbers is the more accurate. The processes are, however, the same as

those which had been tested with the thermometer, in which case the calculated coefficients had been deduced from the odd and even hours separately; and the results rendered it probable that the coefficients obtained by calculation were rather the more accurate. But practically the agreement is so close that either set of numbers may be accepted.

The mean height as got by the two methods shows an equally close agreement in five out of the seven observatories, while in the remaining two the discrepancies are as great as 0·020 for Valencia and 0·034 for Glasgow. This, doubtless, depends on the scale-value, which in the case of Glasgow is known to have been affected two or three times in the course of the year 1876 by alteration of focus. As the top of the column is a good way from the fiducial line, this practically amounts to an index error, which of course does not affect the variable terms.

In the numbers relating to the barometer no correction has been made for the discontinuity introduced by breaking off at the two ends of the period analysed, that is, at the beginning and end of a month, when the values of the height and of its differential coefficients of the various orders, are not the same. This, however, does not sensibly affect the comparison of the coefficients obtained in the two ways, though it might very sensibly affect the coefficients if taken as representing those in the true diurnal inequality.

2. Taking the uncorrected coefficients for the several months, we observe a considerable amount of regularity in those of the second and third orders, those of the second being tolerably constant, while those of the third show a well-marked seasonal inequality, as they vanish about the equinoxes, and have opposite signs in summer and winter. The coefficients of the first order appear to be a good deal less regular. This is probably due to two causes: first, the correction for discontinuity decreases with the increase of the order; secondly, the large, non-diurnal fluctuations of the barometer present rises and falls of somewhat the same frequency as those in a regular periodic inequality with a period of some few days, at any rate more than one day; and the uneliminated residues of these large, non-periodic fluctuations, which affect the coefficients of the true diurnal inequality, would accordingly have greater influence the lower be the order of the term. The latter cause or irregularity is probably the more serious of the two.

It is satisfactory to find that a well-marked seasonal constancy or inequality in the diurnal fluctuation for the different months exhibits itself in the reduction of observations extending only over one year.

Read—A memorandum from Captain Toynbee reporting that since the last meeting nine logs had been received, seven of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
027 Capt. James Clarke, R.N.R.	S.S. "Olbers" -	Aug. 17, 1883—Jan. 11, 1884.	Brazil, New York, Liverpool.	—
Capt. James Donaldson.	S.S. "Bolivia" -	Sept. 3—Dec. 12, 1883.	New York and Glasgow, three voyages.	—
032 Capt. T. W. Freeman	S.S. "Bellerophon."	Sept. 19, 1883—Jan. 16, 1884.	Liverpool, China, London	1883, p. 54.
Capt. W. L. Rosseter	"St. Kilda" -	Sept. 17, 1883—Feb. 10, 1884.	Liverpool, Demerara, London.	1883, p. 54.
Capt. James Simpson	Barquentine "Traveller."	Apr. 4—Nov. 22, 1883.	Newcastle, Ivigtut, Philadelphia, and home.	1882, p. 96.
B. Leigh Smith, Esq., and W. H. Neale, M.B.	S.S. "Eira" and Cape Flora after loss of ship.	June 21, 1881—Aug. 2, 1882.	Arctic regions.	—
Com. Hon. F. C. P. Vereker and Lieut. A. Balfour.	H.M.S. "Magpie."	Sept. 1, 1883—Jan. 1, 1884.	Surveying Borneo, &c. -	1883, p. 82.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Clarke, and the Charts (O. 32) to Captain Donaldson, and to convey the best thanks of the Council to the other observers.

He was specially instructed to convey the thanks of the Council to Mr. Leigh Smith.

Submitted—The following report (Minutes, 1882, p. 75) :—

(M.O. 310.)

DEAR SIR, The Kew Observatory, February 1, 1884.

I HAVE the honour to report that the self-registering drum aneroid by Negretti and Zambra was in constant action here from January 8 to May 8, 1883, and from December 2 to December 10, 1883, and was found to work very well, the hourly records being all clearly marked, and not a single failure or stoppage of clock recorded.

Tabulations of the curves were made at the hours corresponding to the control readings of the standard barometer, and compared with those readings from January 23rd to March 9th, and also during a second period from December 2nd to December 10th, 1883.

The mean difference in the results so obtained show that the aneroid readings compared with the standard barometer reduced to a temperature of 32° F. are — ·025 in. with the extreme differences of +0·10 in. at 29·4 in., and —0·04 ins. at 30·5 ins.

After the instrument had stood still for an interval of seven months, it was started afresh, and the results appeared to be practically the same as before.

There does not seem to be any marked difference between the errors when the barometer is rising or falling, but this will be due to the fact that the instrument only records once hourly, and then the short line made by the pencil covers nearly half an hour on the time scale.

This fact also prevents the instrument affording any information as to the occurrence of squalls, or the passage of air-waves of less than at least three hours in duration.

I fear, therefore, that it can only be considered a rough appliance at the best, and not so suitable for adoption at stations where it would be possible to work either a Redier or photographic barograph.

The fixing of the paper on the cylinder is very simple, as is also the adjustment of the pencil to the scale, and its replacement when requisite. This, however, is not frequently necessary, the pencil originally placed in the instrument being still *in situ* and in good order.

Curves and tabulations are forwarded herewith.

Yours, &c.
(Signed) G. M. WHIPPLE,
Superintendent.

Submitted—The following report :—

REPORT on the SCOTTISH METEOROLOGICAL STATIONS in connexion with the METEOROLOGICAL COUNCIL for 1883.

BAROMETERS.

The barometers at all the stations were compared with inspector's mercurial standard barometer No. 588, and the thermometers with inspector's standard No. 2,522. It is with much satisfaction I am able to report that this standard barometer has not once been detected to be out of order in any way since it began to be used in 1881. The small aneroid No. 11 was also read at each inspection, but as its readings are very irregular, it is not intended to include them in this report.

The following table gives the corrected readings of standard No. 588, and the uncorrected readings of the reporting and check barometers at each of the stations, from which it appears that all of these instruments continue to be in excellent order :—

STATIONS.	Inspector's Standard No. 588. Corrected.	Reporting Barometer. Uncorrected.	Check Barometer. Uncorrected.	REMARKS.
Dundee	29·089	29·090	—	
Aberdeen	28·614	29·610	—	In post office.
Do.	28·879	—	28·880	In house.
Braemar	28·191	28·199	—	
Nairn	29·331	29·331	29·327	
Inverness	29·529	29·529	—	Red. same temp.
Dunrobin	30·007	30·009	—	
Wick	29·713	—	29·713	In house.
Do.	29·773	29·772	—	In shop.
Dunrossness	29·962	29·963	29·960	
Sandwick	30·080	30·093	—	
Stornoway	29·983	29·984	29·982	
Laudale	29·543	29·557	29·551	Red. to same temp.* Check barometer is 8 feet higher.
Rothesay	29·667	29·670	—	
Ardrossan	30·068	30·067	Under repair	
Leith	30·002	29·993	—	In house.
Do.	29·983	—	29·978	Red. to same temp.*
Pinmore	29·371	29·372	—	This is observer's second reading.
OBSERVATORIES.				
Aberdeen	29·663	29·665		
Glasgow	29·465	29·472		

* In these two instances, the difference between the attached thermometer of the Inspector's and of the station barometer has been allowed for.

Excepting at two stations referred to below, the difference between the observer's and inspector's readings in no case exceeded 0·002 inch. In setting the vernier and reading off, I use a magnifying glass, but the observation is made by each observer in his usual way. The observer at Leith set the vernier 0·004 too low. On a second reading being taken he did it correctly.

Thermometers.

The following table gives the results of comparisons made with inspector's standard No. 2,522, and the thermometers at the different stations and observatories, the readings of the standard being corrected for instrumental errors, none of the Kew corrections for the station thermometers, however, being allowed for:—

Stations.	Standard No. 2,522. Corrected.	Dry Bulb.	Wet Bulb.	Spare T.	Max.	Min.	Time in Water, in Minutes.	Range of Temp.	Notes.
	°	°	°	°	°	°		°	
Dundee -	59·2	+0·5	+0·6	—	+1·3	−0·2	90	Uniform	
Aberdeen -	56·5	+0·4	+0·5	+0·4	+0·5	+0·1	80	−0·2	
Braemar -	51·6	+0·5	+0·5	—	+0·5	−0·2	80	+0·1	
Nairn -	56·0	+0·2	+0·7	+0·7	0·0	+1·0	75	+0·1	
Inverness -	57·1	0·0	+0·1	—	−0·1	+0·1	40	Uniform	Min. on grass −0°·3.
Dunrobin -	62·0	−0·4	−0·5	—	+0·5	−0·7	90	+0·2	
Wick -	59·8	+0·4	+0·4	—	0·0	+0·1	60	Uniform	
Dunrossness	57·1	+0·3	+0·4	+0·2	+0·4	−0·5	140	+0·1	
Sandwick -	58·0	+0·3	−0·1	—	+0·5	−0·5	180	+0·2	Max.Sun +0°·2.
Stornoway -	57·7	+0·7	+0·6	+0·5	−0·3	−0·4	70	+0·3	Min. on grass 0°·0.
Laudale -	61·9	+0·2	+0·1	—	+0·2	+0·2	120	Uniform	
Rothesay -	57·5	−0·1	0·0	—	0·0	−0·2	75	−0·2	
Ardrossan -	58·5	+0·4	+0·4	—	0·0	−0·4	70	+0·3	
Leith -	49·3	+0·2	+0·5	—	+0·1	−0·2	40	+0·4	
Pinmore -	46·7	+0·2	+0·3	—	−0·3	−0·1	80	−0·2	
Observatories.									
Aberdeen -	58·7	−0·1	+0·5	—	+0·5	0·0	70	Uniform	
					No.10579	No. 5433			
Glasgow -	54·6	+0·2	0·0	—	0·0	−0·1	110	Uniform	Min. No. 1,222 −0°·2. Min. on grass −0°·9.

Since last report a new minimum thermometer has been supplied to Laudale, and a new maximum to Leith. The thermometers at Stornoway are to be removed to a better position; and arrangements have been definitely made for clearing off a considerable part of the wood close to the station at Nairn, by which the whole of the observations will be improved.

Hygrometers.

The observations of the dry and wet bulbs are so well made generally as to call for no special remark.

Box for Thermometers.

Since last inspection, the louvre-boarded box at Leith has been thoroughly repaired, painted, and firmly fixed in position; and it has been found necessary from the experience of the Tay Bridge storm, to "stay" the box at Laudale with stout wire (No. 10) double and twisted, so that these instruments are now secured against violent winds. At Girvan the box has been placed at the edge of a grass plot; the ground is in future to have a covering of turf all round it. A new box, to replace the old one constructed in 1859, for the station at Dunrobin is to be made. At Braemar the barometers and thermometers in shade are placed in a large wooden screen, designed by the late Prince Consort and Sir James Clark in 1855, in the form of an octagon, 8 feet in diameter and louvred all round. The instruments belong to Her Majesty. It is proposed to add a Stevenson's screen to the observing instruments at this station, in order to ascertain what temperatures are obtained by the screen so long in use and the screen now in general use among meteorologists.

Rain Gauges.

It will be seen from the "squeeze" sent in October, that the rain gauge at Leith was at the date of inspection considerably off the circular. It was then made circular. How the tendency of several of the rain gauges to lose their circular form by weathering may be caused is a curious question; but it is surely no great difficulty to construct a rain gauge, which would not be liable to any such deformation.

At Aberdeen Observatory the pencil tracings examined were clear and distinct, and an examination showed that the pencil worked without any undue friction. The pencil tracings of the rain gauge at Glasgow Observatory were also carefully examined, particularly the first part of the

tracing after each emptying of the gauge. The tracing from 7 to 8 p.m. of August 13th is very curious, and not easy to account for.

Anemometers.

The little wooden hut for the anemometer at Sandwick was thoroughly repaired and re-painted in spring. As regards the anemograph sheets, when the pin is pressed down at 10.30 a.m. it marks 10.15 a.m. on the sheet, there being thus a constant error of 15 minutes on the sheets, and this error has probably continued since last time the instrument was repaired. The irregularity in the velocity curve at Aberdeen noticed in last report was, in all cases I had an opportunity of examining, much reduced. At Braemar the anemometer is on a pole 18 feet high, which was a suitable position at the time it was first placed there, but as some trees have grown up round the plot of grass of the observatory, interfering somewhat with the readings, it is proposed to raise it a little higher.

Sunshine Recorder.

The inquiry I was asked to make by the Office, as to whether the sunshine recorder at Sandwick indicated correctly, was made, and it was found that the instrument had inadvertently not been fixed in position due north and south in changing it from the winter to the summer position. The orientation of the instrument was rectified.

Notes on the Stations.

Aberdeen (inspected August 9th).—Stevenson's Screen was ordered to be repainted. Everything else at this Station was found to be in very good order.

Nairn (inspected August 14th).—All the instruments were in good order, were correctly read and reduced by Miss Penny, who was in charge of the station at the time of inspection, Mr. Penny having been suddenly called away owing to the death of his brother. I am glad to report that definite arrangements have at last been made for clearing away a considerable portion of the wood close to this station, by which the observations will be much improved.

Wick (inspected August 17).—Everything at this station was in good order, and no change was required.

Dunrossness (inspected August 20th).—At the time of inspection the Rev. W. Brand was on his annual ministerial visit to Fair Island, but Mrs. Brand made and reduced all the observations, prepared the daily report, and despatched it to London in a very satisfactory manner. Attention was directed to the careful recording of all changes of weather occurring between two telegraphic messages to the Meteorological Office; and in future care is to be given that these changes are to be incorporated into the first message sent thereafter to London.

Stornoway (inspected August 25).—The observations are carefully and correctly made by Mr McDonald and his daughter. By some mistake, the rain-gauge and Stevenson's screen remained in the positions they occupied at last inspection. Mr. McDonald was directed to remove them to the position indicated in my report of last year, and to intimate the date of change to the Office. The instruments are well attended to.

Ardrossan (inspected September 5th).—During the recent repairs in the Post Office, the reporting barometer was broken, and since then the check barometer has been used instead. This instrument, as the comparison with the standard showed, had been safely conveyed from Saltcoats to its position at Ardrossan.

As requested, special inquiry was made regarding the wind observations made at this station. From a long conversation with Mr. Mayes it seemed to me that these observations are made by him with fair intelligence. He stated as a fact that considerably more damage was done to the slates and chimney-pots at Saltcoats than at Ardrossan, but did not think the gusts of wind were stronger at the latter place. It is, however, possible that at Ardrossan those gusts may be less strong which accompany the winds blowing straight upon the abrupt rising ground or cliff immediately to eastward of the village. This point I shall give some attention to at next inspection.

Leith (inspected October 27th).—The observer read the barometer 0·004 inch too low, and all his readings hitherto have probably been too low to that amount. After being shown the proper way of setting the vernier, he took several readings and all of them were correctly made. The old maximum thermometer which was not working quite satisfactorily, was replaced by a new one from the Office in July last. The check barometer which had been removed to its present position on the death of Mr. Hutchison, was compared and found in good order. Shortly after last inspection, the Stevenson's screen was thoroughly repaired, painted, and firmly fixed, and the rain-gauge was also repaired and well fixed. A reference to the "squeeze" made at this inspection, shows that the rim of the raingauge was far from being circular. The observer, under direction, restored its circularity. How the tendency of some of the gauges to lose the circular form by weathering is brought about is a curious question; but surely there need be no difficulty to construct rain gauges which would not be liable to any such deformation.

Dundee (inspected August 8).—The observations are made within the grounds of the Dundee Cemeteries. The situation is open, on a long ridge lying east and west, and sloping southwards to the Firth of Tay. The thermometer screen is of the pattern supplied to the stations of the Scottish Meteorological Society before Stevenson's came into use, which it closely resembles. The instruments were all in good order and carefully observed. The maximum thermometer was broken in the end of 1879 and replaced by the present one, it being omitted at the time to report the fact to the Office. From the date of inspection, the thermometric observations, which had previously been read only to whole degrees, were begun to be read to tenths of a degree. The rain-gauge is placed in an open space in the grounds at some distance from the other instruments.

Braemar (inspected August 10).—This station is in a small open grass field near the centre of the village which slopes slightly to westward. The instruments belong to the Queen. They are all in excellent order and are read with care and intelligence by Mr. Aitken. The barometer and thermometers in shade are placed in a large wooden screen designed by the late Prince Consort and Sir James Clark in 1855, in the form of an octagon, 8 feet in diameter, and louvred all round. A Stevenson's screen will be added to the observing instruments with the view of ascertaining what temperatures are obtained by the screen so long in use and the screen now in general use among meteorologists. There is a snow gauge at this station about 18 inches in diameter and 2 feet in height. There is a vane and an anemometer on a stout pole with ladder, 18 feet high, its position at the time of erection was very good, but some trees have since grown up in the vicinity which possibly may somewhat shelter the cups. For so hilly a situation the exposure is remarkably good. The degree to which the winds are diverted from their course will appear from the following 15 years averages:—N. 16, N.E. 41, E. 22, S.E. 24, S. 41, S.W. 163, W. 26, N.W. 28, and calms two days. The above mean of 163 days of S.W. winds is greatly above the general average of Scotland.

Inverness (inspected August 15).—In February 1883, the temperature observations ceased to be made, the thermometers being found to be too far from the observer. At the same time the rain-gauge was removed to the present position, which is so unsuitable that the rain observations are worthless. Mr. Fraser removes to another house in May, where, he informed me, suitable arrangements can be made for all the instruments. In the meantime, the barometric, wind and weather observations continue to be made.

Dunrobin (inspected August 16).—The instruments are placed in good positions on a large grass plot forming part of a long narrow strip of ground lying between Dunrobin Castle and the sea. The hilly ground, which rises immediately to westward must occasion deviations in the direction and force of the wind. The mean direction on an average of 12 years is N. 38, N.E. 34, E. 72, S.E. 27, S. 18, S.W. 46, W. 92, and N.W. 38 days, thus showing an undue local predominance of west and east winds. The thermometer box is one of the sort in use when the station was established in 1859 and may be regarded as fairly comparable with Stevenson's screen. A Stevenson's screen is to be added as soon as possible. The instruments were in good order and the observations carefully and correctly made.

Sandwick (inspected August 22).—The anemometer hut was repaired in spring in a thoroughly satisfactorily and substantial manner. The sunshine recorder is placed on a stout squared wooden pillar, box-shaped on the top. On examination, the slate pedestal of the instrument had been inadvertently placed out of its proper position when removed in Spring from its former place, thus confirming the opinion formed in the office that its orientation was not properly attended to. It was put right. Greenwich mean time is observed in making all the observations and every opportunity of bringing correct time from Stromness and Kirkwall is taken advantage of.

All the other instruments were in good order and the observations, as heretofore, continue to be made with correctness and fidelity by Dr. Clouston and his servant Margaret Wishart.

Laudale (inspected August 30).—A new minimum thermometer replaced the old one on January 4th. As the Stevenson's screen is now stayed with stout wire (No. 10), double and twisted, the thermometers may be regarded as secured against the violent winds which occasionally occur at this station. The instruments were all in good order.

Rothesay (inspected September 4).—The station is at Barone Cottage on the rising ground about three-quarters of a mile to the west of Rothesay. The ground there slopes gently to the south. Barone Hill, 530 feet high and 1½ miles distant, is the highest point of a ridge lying approximately from S.W. to N.N.E. of the station. The position is open and the winds observed are only subject to such deflection as may be occasioned by this ridge.

A portion of spirit equal to about a degree was found at the top of the tube of the minimum thermometer. Mr. Kay, under direction, put it right. The rain-gauge was not quite circular; the circularity was restored. All the other instruments were in good order and the observations made with care and accuracy.

Pinmore (inspected November 8).—The station is situated close to the Stinchar in a rather deep valley surrounded by heights and hills. The piece of level ground in the curve of the river near the garden extends to about 10 acres. It is probable that the winds are a good deal deflected owing to the configuration of the land.

The thermometer screen is of the pattern in use before Stevenson's, and closely resembles that screen. It is placed at the edge of a large grass plot, with the black soil of a rose and flower plot on the other side, which is to be turfed for some distance round the screen.

The height of the barometer has been hitherto entered at 187 feet instead of 190 feet, which is the correct height of the cistern. It was known that Mr. Donald set the vernier to the level of the clear surface of the mercury in contact with the glass tube, for which error of observation a provisional correction of +0·035 inch had been adopted. The inspection confirmed the above. The vernier is now set, and the instrument read correctly. As regards the other instruments they were well placed, in good order and well observed.

Aberdeen Observatory (inspected August 11).—The rain-gauge is still, as shown by the squeeze, off the circular, but no attempt was made to alter it owing to its construction. The pencil tracings of the rain gauges, which there was an opportunity of examining, were clear and distinct, and showed that the pencil was working without undue friction. All the instruments were in very good order and well attended to.

Glasgow Observatory (inspected September 5).—The pencil tracings of the rain gauge were carefully examined, particularly the first part of the tracing after each emptying of the gauge. The examination showed an improved distinctness in the tracings. Tracing 7 to 8 p.m. of August 18 is curious, and not easy to be accounted for. Everything at the observatory was in good order.

(Signed) ALEXANDER BUCHAN.

Submitted—The following Memorandum :—

The ATLANTIC WEATHER OBSERVATIONS for the CURRENT PERIOD in connexion with the WEATHER experienced in the BRITISH ISLES.

SIR, February 16, 1884.

WITH respect to the conversation I have recently had with you with regard to the current Atlantic weather, I should like to make a few further remarks.

On examining the United States "Monthy Weather Reviews," recently received, it is seen that the ocean storm tracks over the Atlantic are produced from information received by the 21st of the succeeding month. Beyond doubt we, here, are in a better position to obtain a greater amount of Atlantic weather information than the Americans, and could with a comparatively small amount of labour produce a chart fully equal to theirs, and one which, with a few additional particulars, would add materially to the information respecting the depressions, which form so prominent a feature of our British weather.

Possibly some such information as indicated above might be thought suitable for the Monthly Weather Report now being issued by the Office.

From a pretty constant watch on the Atlantic weather now extending over several years, it has often surprised me with what a limited amount of data it is sometimes possible to either track a storm or prove its non-existence as a storm when within a short distance of our coasts, although with us it may have had exceptional violence.

The following table will show what amount of data might be reasonably expected at an early date if such work were undertaken :—

NUMBER of ATLANTIC WEATHER FORMS received.

Date.	By 15th of following Month.	By 21st of following Month.	Date.	By 15th of following Month.	By 21st of following Month.
1882 :			1883 :		
August - -	195	236	May - -	227	256
September -	227	271	June - -	201	274
October - -	256	298	July - -	247	294
November -	220	257	August - -	247	286
December - -	225	270	September* -	132	157
			October - -	131	147
1883 :			November -	117	140
January - -	199	253	December - -	107	125
February - -	208	250			
March - -	242	292	1884 :		
April - -	214	283	January - -	91	—

* The special collection of observations ended with August 1883.

I am, &c.

Captain Toynbee. (Signed) CHAS. HARDING.

Mr. Scott was instructed to request Captain Toynbee to prepare such a report as was indicated in the memorandum for the month of January.

Mr. Scott reported that he had been invited to attend a meeting of the International Polar Committee, at Vienna, April 22 (Letter 358). He was authorised to attend the meeting.

Submitted—The following reports of the forecasts for the months of July, August, and September 1883:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JULY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	54	50	52	83
,,	b	38	23	31	
,,	c	8	12	10	
,,	d	0	15	7	
Scotland, E.	a	54	35	45	76
,,	b	35	27	31	
,,	c	4	31	17	
,,	d	7	7	7	
England, N.E.	a	65	35	50	81
,,	b	23	38	31	
,,	c	8	12	10	
,,	d	4	15	9	
England, E.	a	54	35	45	89
,,	b	42	46	44	
,,	c	4	12	8	
,,	d	0	7	3	
Midland Cos.	a	50	58	54	89
,,	b	46	23	35	
,,	c	4	8	6	
,,	d	0	11	5	
England, S.	a	69	50	60	81
,,	b	19	23	21	
,,	c	12	23	17	
,,	d	0	4	2	
Scotland, W.	a	50	38	44	81
,,	b	38	35	37	
,,	c	8	12	10	
,,	d	4	15	9	
England, N.W.	a	58	31	45	89
,,	b	42	46	44	
,,	c	0	12	6	
,,	d	0	11	5	
England, S.W.	a	54	38	46	79
,,	b	38	27	33	
,,	c	8	8	8	
,,	d	0	27	13	
Ireland, N.	a	50	58	54	89
,,	b	38	31	35	
,,	c	4	4	4	
,,	d	8	7	7	
Ireland, S.	a	66	35	51	79
,,	b	15	42	28	
,,	c	4	12	8	
,,	d	15	11	13	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	58	42	50	86
,,	b	26	45	36	
,,	c	6	7	6	
,,	d	10	6	8	
Scotland, E.	a	49	61	55	83
,,	b	42	13	28	
,,	c	6	20	13	
,,	d	3	6	4	
England, N.E.	a	78	48	63	86
,,	b	19	26	23	
,,	c	3	16	9	
,,	d	0	10	5	
England, E.	a	90	39	65	92
,,	b	10	45	27	
,,	c	0	16	8	
,,	d	0	0	0	
Midland Cos.	a	71	48	60	92
,,	b	26	39	32	
,,	c	0	10	5	
,,	d	3	3	3	
England, S.	a	87	55	71	91
,,	b	13	26	20	
,,	c	0	16	8	
,,	d	0	3	1	
Scotland, W.	a	58	35	47	77
,,	b	32	29	30	
,,	c	3	10	7	
,,	d	7	26	16	
England, N.W.	a	55	23	39	79
,,	b	32	48	40	
,,	c	10	16	13	
,,	d	3	13	8	
England, S.W.	a	78	52	65	96
,,	b	16	45	31	
,,	c	3	3	3	
,,	d	3	0	1	
Ireland, N.	a	42	42	42	76
,,	b	39	29	34	
,,	c	10	16	13	
,,	d	9	13	11	
Ireland, S.	a	58	35	47	84
,,	b	23	52	37	
,,	c	6	10	8	
,,	d	13	3	8	

SUMMARY.

British Isles	a	57	42	50	83
,,	b	34	33	33	
,,	c	6	13	10	
,,	d	3	12	7	
British Isles	a	66	44	55	86
,,	b	25	36	31	
,,	c	4	13	8	
,,	d	5	7	6	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

AUGUST.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	30	37	34	74
,,	b	44	37	40	
,,	c	15	7	11	
,,	d	11	19	15	
Scotland, E.	a	30	44	37	69
,,	b	37	26	32	
,,	c	29	11	20	
,,	d	4	19	11	
England, N.E.	a	44	44	44	74
,,	b	41	19	30	
,,	c	15	19	17	
,,	d	0	18	9	
England, E.	a	55	45	50	87
,,	b	41	33	37	
,,	c	4	11	8	
,,	d	0	11	5	
Midland Cos.	a	52	41	47	82
,,	b	33	37	35	
,,	c	11	18	14	
,,	d	4	4	4	
England, S.	a	63	41	52	83
,,	b	29	33	31	
,,	c	4	22	13	
,,	d	4	4	4	
Scotland, W.	a	44	26	35	65
,,	b	30	30	30	
,,	c	15	18	17	
,,	d	11	26	18	
England, N.W.	a	41	30	36	75
,,	b	41	37	39	
,,	c	11	15	13	
,,	d	7	18	12	
England, S.W.	a	44	41	43	80
,,	b	33	41	37	
,,	c	4	7	5	
,,	d	19	11	15	
Ireland, N.	a	48	41	45	70
,,	b	22	29	25	
,,	c	8	15	12	
,,	d	22	15	18	
Ireland, S.	a	34	33	34	69
,,	b	33	37	35	
,,	c	22	8	15	
,,	d	11	22	16	

8 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	26	42	34	80
,,	b	52	39	46	
,,	c	19	13	16	
,,	d	3	6	4	
Scotland, E.	a	32	52	42	79
,,	b	45	29	37	
,,	c	16	6	11	
,,	d	7	13	10	
England, N.E.	a	55	39	47	83
,,	b	35	36	36	
,,	c	7	6	6	
,,	d	3	19	11	
England, E.	a	52	42	47	86
,,	b	39	39	39	
,,	c	6	6	6	
,,	d	3	13	8	
Midland Cos.	a	52	29	41	83
,,	b	42	42	42	
,,	c	0	19	9	
,,	d	6	10	8	
England, S.	a	62	45	54	86
,,	b	32	32	32	
,,	c	3	10	6	
,,	d	3	13	8	
Scotland, W.	a	45	45	45	81
,,	b	35	36	36	
,,	c	10	13	11	
,,	d	10	6	8	
England, N.W.	a	52	52	52	83
,,	b	32	29	31	
,,	c	13	13	13	
,,	d	3	6	4	
England, S.W.	a	55	48	52	76
,,	b	29	20	24	
,,	c	3	19	11	
,,	d	13	13	13	
Ireland, N.	a	55	55	55	81
,,	b	23	29	26	
,,	c	6	10	8	
,,	d	16	6	11	
Ireland, S.	a	26	39	33	78
,,	b	52	39	45	
,,	c	16	9	13	
,,	d	6	13	9	

SUMMARY.

British Isles	a	44	38	41	75
,,	b	35	33	34	
,,	c	13	14	14	
,,	d	8	15	11	
British Isles	a	46	44	45	81
,,	b	38	34	36	
,,	c	9	11	10	
,,	d	7	11	9	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

SEPTEMBER.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	29	30	30	77
"	b	46	48	47	
"	c	8	0	4	
"	d	17	22	19	
Scotland, E.	a	46	57	52	75
"	b	29	17	23	
"	c	13	17	15	
"	d	12	9	10	
England, N.E.	a	34	39	37	79
"	b	54	30	42	
"	c	4	22	13	
"	d	8	9	8	
England, E.	a	54	39	47	73
"	b	21	31	26	
"	c	8	13	10	
"	d	17	17	17	
Midland Cos.	a	54	31	43	73
"	b	21	39	30	
"	c	4	17	10	
"	d	21	13	17	
England, S.	a	58	52	55	79
"	b	21	26	24	
"	c	4	9	6	
"	d	17	13	15	
Scotland, W.	a	21	46	34	63
"	b	46	13	29	
"	c	12	8	10	
"	d	21	33	27	
England, N.W.	a	29	48	39	67
"	b	38	18	28	
"	c	12	17	14	
"	d	21	17	19	
England, S.W.	a	42	35	39	66
"	b	29	26	27	
"	c	13	9	11	
"	d	16	30	23	
Ireland, N.	a	9	48	29	70
"	b	65	17	41	
"	c	13	22	17	
"	d	13	13	13	
Ireland, S.	a	31	39	35	65
"	b	30	30	30	
"	c	17	9	13	
"	d	22	22	22	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	63	40	52	75
"	b	13	34	23	
"	c	7	13	10	
"	d	17	13	15	
Scotland, E.	a	57	37	47	80
"	b	23	43	33	
"	c	7	7	7	
"	d	13	13	13	
England, N.E.	a	47	40	44	80
"	b	33	40	36	
"	c	7	10	9	
"	d	13	10	11	
England, E.	a	43	37	40	80
"	b	40	40	40	
"	c	7	13	10	
"	d	10	10	10	
Midland Cos.	a	50	33	42	82
"	b	33	47	40	
"	c	10	10	10	
"	d	7	10	8	
England, S.	a	47	33	40	82
"	b	30	54	42	
"	c	10	10	10	
"	d	13	8	8	
Scotland, W.	a	33	47	40	74
"		30	37	34	
"	c	17	3	10	
"	d	20	30	16	
England, N.W.	a	40	47	44	77
"	b	40	27	33	
"	c	7	10	9	
"	d	13	16	14	
England, S.W.	a	35	35	35	75
"	b	34	45	40	
"	c	14	17	15	
"	d	17	3	10	
Ireland, N.	a	57	59	58	82
"	b	27	21	24	
"	c	3	10	7	
"	d	13	10	11	
Ireland, S.	a	52	39	46	69
"	b	21	25	23	
"	c	10	18	14	
"	d	17	18	17	

SUMMARY.

British Isles	a	37	42	40	71
"	b	36	27	31	
"	c	10	13	12	
"	d	17	18	17	
British Isles	a	48	41	45	78
"	b	29	37	33	
"	c	9	11	10	
"	d	14	11	12	

Reported—That the cash accounts for the six months ended the 30th September 1883 were audited by the Chairman and Mr. Galton on the 9th instant, and had been sent to the Treasury for the Audit Office. The receipts for the six months, exclusive of a balance of 1,087*l.* 19*s.* 11*d.* on the 1st April, amounted to 7,461*l.* 16*s.* 9*d.* The payments amounted to 7,638*l.* 15*s.* 2*d.* leaving a balance of 911*l.* 1*s.* 6*d.* in hand and at the Bank on the 1st October 1883.

116, *Victoria Street, March* 5, 1884.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 19) were read and confirmed.

Submitted—The following report (Minutes, p. 112):—

Meteorological Office, Marc 5, 1884

SIR,

IN accordance with the Council's instructions, I have had the accompanying repoi prepared: it has taken about six days of one clerk's time.

In order to keep up such work, it would be requisite to use means to increase the number of forms received from observers, as they have been gradually falling off since the end of the year 1883.

Our present system being only to send blank forms to those captains who continue to observe for the Office, and to others returning from long voyages who are likely to have North Atlantic data, previous to 1st September 1883, in their outward logs. This work takes about half-an-hour of a clerk's time, and two hours of a youth's time daily.

It is believed that the necessary data for continuing the monthly tracks could be got in by about three hours daily of a youth's time, after he had received a little training.

I am, &c.

(Signed) HENRY TOYNBEE,
Marine Superintendent.

The Secretary,
Meteorological Office.

Mr. Scott was instructed to have the report printed as a part of the Monthly Weather Report for January, with a note explaining that the report was only a specimen of what might be prepared, and that it would not be continued at present.

Read—Letter (No. 443) from Mr. Abercromby, submitting some specimens of cloud photographs (Minutes, 1881, p. 7).

Mr. Scott was instructed to request him to submit, for the inspection of the Council, the entire series of his photographs.

Submitted—Specimen charts of barometrical pressure for the three oceans for the month of August, by Mr. Baillie (Minutes, 1882, p. 56).

Read—A memorandum from Captain Toynbee reporting that since the last meeting 7 logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. S. H. Bolton -	S.S. "Tyne Queen."	Sept. 7, 1883—Feb. 17, 1884.	British ports to Spanish ports, 3 voyages.	1883, p. 54.
Capt. J. I. Dunbar	S.S. "Martaban"	Aug. 9, 1883—Feb. 17, 1884.	Liverpool, Rangoon, and home.	1883, p. 66.
Capt. W. M. Grieve	S.S. "City of York."	Jan. 8, 1883—Feb. 18, 1884.	Glasgow, Adelaide, San Francisco, and home.	1880, p. 9.
Capt. W. N. Lailey -	S.S. "Derwent"	Sept. 22, 1883—Feb. 24, 1884.	Newport and Mediterranean, 2 voyages.	1882, p. 113.
O 27 Capt. J. H. Price -	Barque "Viola"	May 4, 1883—Feb. 6, 1884.	Liverpool, Valparaiso, and home.	—
Capt. E. J. Raeburn, R.N.R.	"Lochee" -	March 8, 1883—Feb. 3, 1884.	Plymouth, Australia, San Francisco, and home.	1882, p. 102.
Capt. W. J. L. Wharton Lieut. W. Richardson.	H.M.S. "Sylvia"	Sept. 13, 1883—Jan. 14, 1884.	Surveying River Plate -	1883, p. 78.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Price, and to convey the best thanks of the Council to the other observers.

Reported—That Captain J. M'Donald Gray, who had kept 12 "excellent" logs for the Office, had been accidentally drowned at Fleetwood on the 17th ultimo.

Mr. Scott was instructed to express to Mrs. Gray the sincere regret of the Council to hear of her husband's death.

Submitted the following statements of work for February 1884:—

MARINE ROOM.

March 4, 1884.

Examined 13 new logs and 2 lighthouse registers.

North Atlantic Weather Charts.

The first drawing of isobars for September 1882 completed, and those for October commenced.
Air and sea isotherms for October well advanced.
The preparation of sea observations kept up to date.
Acknowledging receipt of forms and sending captains a fresh supply.
One clerk engaged for about three weeks collecting data from ships arriving in the ports of London and Liverpool.

General.

Preparing North Atlantic storm tracks for January 1884, with remarks on each storm.
Indexing data in ocean 10-degree squares
Making extracts from log 5,741—Comet observations for the Royal Astronomical Society.
Variation chart for 1880 prepared for insertion in meteorological logs.
Supplying weather information to the Board of Trade and to the Marine Insurance Company.

(Signed) CHAS. HARDING.

The Marine Superintendent. H. T.

TELEGRAPHIC (FORECAST AND STORM WARNINGS) BRANCH.

Preparation of Monthly Weather Report.—1884, *January* completed, and printed proof of section 2 revised. 1884, *February* kept well up to date; preparation of tables just commenced. 1883, *January*, about one-third done, being pushed on with rapidity.

Tables of Mean Values, &c. for the Daily Weather Report Stations for January to March 1877 (for Quarterly Weather Report, Part I., 1877).—Completed and handed in.

Arrears of Forecast Checking.—Completed up to end of December 1883, and tabulated summaries handed in herewith. Those for January and February 1884 are about half done.

(Signed) FREDC. GASTER.

R. H. Scott, Esq., F.R.S.

PANTAGRAPH ROOM.

February 29, 1884.

Quarterly Weather Report, Part III., 1876.—Proofs of the letterpress and plates have had a first revise.

Part IV., 1876.—The general summary of the weather has been completed, and chart plates 19, 20, and 21 pantagraphed and etched.

Part I., 1877.—Charts of monthly means drawn.

Copies of tabulations for December and January made for Mr. Buchan.

Anemograms for January 26, 1884, specially tabulated for maximum rates of velocity during the gale.

Copy, on a reduced scale, of results of experiments on evaporation made for printer.

Copies, on reduced scale, of diagrams, of average frequency and amount of rainfall made for printer.

Some time was also taken up in connexion with the curves showing barometric disturbance of August 1883, and with the Hampstead Heath sunshine recorder.

Harmonic Analyser.—The second analysis of the Valencia temperature curves for 1871 has been completed, and the analysis of the thermograms for 1878 carried as far as Armagh. Some special work with the barometer constants for 1876 is now in hand for Professor Stokes.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

SIR, March 1, 1884.

The following *Curves* and *Tabulations* have been examined during the month of February 1884:—May (1882), *Anemograms*, one stations.

June (1882), *Anemograms*, one station.

July (1882), *Barograms*, two stations; *Anemograms*, five stations.

August (1882), *Thermograms*, five stations; *Barograms*, five stations; *Anemograms*, one station.

The observations (*barometrical*) taken at *Dun Echt* (Scotland) during the gale of the 26th and 27th January 1884 have also been reduced and plotted.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S., Secretary, Meteorological Council. (Signed) T. E. ALLEN.

Submitted—The following reports on the forecasts for the months of October November, and December 1883 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

OCTOBER, 1883.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	33	52	43	72
,,	b	33	26	29	
,,	c	26	7	17	
,,	d	8	15	11	
SCOTLAND, E.	a	22	33	28	70
,,	b	33	52	42	
,,	c	37	8	23	
,,	d	8	7	7	
ENGLAND, N.E.	a	30	30	30	78
,,	b	41	55	48	
,,	c	22	15	19	
,,	d	7	0	3	
ENGLAND, E.	a	54	38	46	79
,,	b	31	35	33	
,,	c	15	15	15	
,,	d	0	12	6	
MIDLAND COS.	a	48	48	48	89
,,	b	45	37	41	
,,	c	7	7	7	
,,	d	0	8	4	
ENGLAND, S.	a	58	50	54	91
,,	b	35	38	37	
,,	c	7	12	9	
,,	d	0	0	0	
SCOTLAND, W.	a	19	41	30	62
,,	b	22	41	32	
,,	c	37	7	22	
,,	d	22	11	16	
ENGLAND, N.W.	a	30	33	32	72
,,	b	33	48	40	
,,	c	22	8	15	
,,	d	15	11	13	
ENGLAND, S.W.	a	54	46	50	79
,,	b	23	35	29	
,,	c	23	12	18	
,,	d	0	7	3	
IRELAND, N.	a	37	59	48	72
,,	b	26	22	24	
,,	c	22	4	13	
,,	d	15	15	15	
IRELAND, S.	a	27	35	31	79
,,	b	46	50	48	
,,	c	12	11	12	
,,	d	15	4	9	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	42	42	42	80
,,	b	36	39	38	
,,	c	16	6	11	
,,	d	6	13	9	
SCOTLAND, E.	a	49	49	49	88
,,	b	35	42	39	
,,	c	16	6	11	
,,	d	0	3	1	
ENGLAND, N.E.	a	49	45	47	78
,,	b	29	32	31	
,,	c	19	16	17	
,,	d	3	7	5	
ENGLAND, E.	a	65	48	57	92
,,	b	29	42	35	
,,	c	6	3	5	
,,	d	0	7	3	
MIDLAND COS.	a	58	58	58	89
,,	b	36	26	31	
,,	c	3	6	5	
,,	d	3	10	6	
ENGLAND, S.	a	71	65	68	93
,,	b	26	23	25	
,,	c	3	9	6	
,,	d	0	3	1	
SCOTLAND, W.	a	29	42	36	73
,,	b	26	49	37	
,,	c	29	3	16	
,,	d	16	6	11	
ENGLAND, N.W.	a	29	36	33	73
,,	b	35	45	40	
,,	c	26	13	19	
,,	d	10	6	8	
ENGLAND, S.W.	a	42	45	44	79
,,	b	26	45	35	
,,	c	26	7	17	
,,	d	6	3	4	
IRELAND, N.	a	32	45	39	76
,,	b	39	35	37	
,,	c	19	10	14	
,,	d	10	10	10	
IRELAND, S.	a	45	42	44	78
,,	b	26	42	34	
,,	c	10	13	11	
,,	d	19	3	11	

SUMMARY.

BRITISH ISLES	a	37	42	40	76
,,	b	33	40	36	
,,	c	22	10	16	
,,	d	8	8	8	

BRITISH ISLES	a	46	47	47	81
,,	b	31	38	34	
,,	c	16	8	12	
,,	d	7	7	7	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

NOVEMBER, 1883.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecas .	Percentage of Success a + b.
SCOTLAND, N.	a	36	60	48	84
,,	b	40	32	36	
,,	c	8	4	6	
,,	d	16	4	10	
SCOTLAND, E.	a	36	56	46	70
,,	b	36	12	24	
,,	c	16	12	14	
,,	d	12	20	16	
ENGLAND, N.E.	a	32	56	44	80
,,	b	48	24	36	
,,	c	12	12	12	
,,	d	8	8	8	
ENGLAND, E.	a	44	44	44	78
,,	b	40	28	34	
,,	c	16	16	16	
,,	d	0	12	6	
MIDLAND COS.	a	28	56	42	84
,,	b	56	28	42	
,,	c	12	8	10	
,,	d	4	8	6	
ENGLAND, S.	a	32	60	46	82
,,	b	52	20	36	
,,	c	8	12	10	
,,	d	8	8	8	
SCOTLAND, W.	a	28	40	34	72
,,	b	48	28	38	
,,	c	16	16	16	
,,	d	8	16	12	
ENGLAND, N.W.	a	20	48	34	68
,,	b	36	32	34	
,,	c	32	16	24	
,,	d	12	4	8	
ENGLAND, S.W.	a	36	52	44	72
,,	b	28	28	28	
,,	c	24	8	16	
,,	d	12	12	12	
IRELAND, N.	a	36	36	36	74
,,	b	36	40	38	
,,	c	12	16	14	
,,	d	16	8	12	
IRELAND, S.	a	32	56	44	74
,,	b	40	20	30	
,,	c	8	8	8	
,,	d	20	16	18	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	44	67	56	81
,,	b	30	20	25	
,,	c	13	13	13	
,,	d	13	0	6	
SCOTLAND, E.	a	44	57	51	77
,,	b	33	20	26	
,,	c	10	13	12	
,,	d	13	10	11	
ENGLAND, N.E.	a	60	40	50	82
,,	b	24	40	32	
,,	c	3	17	10	
,,	d	13	3	8	
ENGLAND, E.	a	64	40	52	83
,,	b	23	40	31	
,,	c	10	13	12	
,,	d	3	7	5	
MIDLAND COS.	a	50	50	50	82
,,	b	37	27	32	
,,	c	7	13	10	
,,	d	6	10	8	
ENGLAND, S.	a	50	57	54	82
,,	b	33	23	28	
,,	c	10	10	10	
,,	d	7	10	8	
SCOTLAND, W.	a	40	47	44	79
,,	b	37	33	35	
,,	c	17	7	12	
,,	d	6	13	9	
ENGLAND, N.W.	a	23	54	39	84
,,	b	57	33	45	
,,	c	13	13	13	
,,	d	7	0	3	
ENGLAND, S.W.	a	50	53	52	84
,,	b	37	27	32	
,,	c	10	13	11	
,,	d	3	7	5	
IRELAND, N.	a	44	54	49	82
,,	b	33	33	33	
,,	c	13	13	13	
,,	d	10	0	5	
IRELAND, S.	a	40	57	49	77
,,	b	30	27	28	
,,	c	17	10	14	
,,	d	13	6	9	

SUMMARY.

BRITISH ISLES	a	33	51	42	77
,,	b	42	27	35	
,,	c	15	11	13	
,,	d	10	11	10	
BRITISH ISLES	a	46	53	50	81
,,	b	34	29	31	
,,	c	11	12	12	
,,	d	9	6	7	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

DECEMBER, 1883.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	43	70	57	85
,,	b	35	22	28	
,,	c	13	4	9	
,,	d	9	4	6	
Scotland, E.	a	44	61	53	83
,,	b	43	18	30	
,,	c	4	4	4	
,,	d	9	17	13	
England, N.E.	a	30	44	37	68
,,	b	35	26	31	
,,	c	26	17	21	
,,	d	9	13	11	
England, E.	a	35	30	33	63
,,	b	39	22	30	
,,	c	17	39	28	
,,	d	9	9	9	
Midland Cos.	a	48	39	44	76
,,	b	30	35	32	
,,	c	9	17	13	
,,	d	13	9	11	
England, S.	a	39	22	31	66
,,	b	35	35	35	
,,	c	17	35	26	
,,	d	9	8	8	
Scotland, W.	a	26	48	37	68
,,	b	35	26	31	
,,	c	22	26	24	
,,	d	17	0	8	
England, N.W.	a	31	48	40	68
,,	b	30	26	28	
,,	c	17	22	19	
,,	d	22	4	13	
England, S.W.	a	52	74	63	87
,,	b	31	17	24	
,,	c	13	9	11	
,,	d	4	0	2	
Ireland, N.	a	30	65	48	78
,,	b	35	26	30	
,,	c	13	9	11	
,,	d	22	0	11	
Ireland, S.	a	39	48	44	81
,,	b	31	44	37	
,,	c	13	4	9	
,,	d	17	4	10	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	37	70	54	82
,,	b	40	17	28	
,,	c	13	3	8	
,,	d	10	10	10	
Scotland, E.	a	43	54	49	77
,,	b	33	23	28	
,,	c	17	7	12	
,,	d	7	16	11	
England, N.E.	a	54	37	46	77
,,	b	23	40	31	
,,	c	20	13	17	
,,	d	3	10	6	
England, E.	a	43	50	47	77
,,	b	40	20	30	
,,	c	10	23	16	
,,	d	7	7	7	
Midland Cos.	a	50	60	55	82
,,	b	33	20	27	
,,	c	10	10	10	
,,	d	7	10	8	
England, S.	a	53	47	50	82
,,	b	37	27	32	
,,	c	7	13	10	
,,	d	3	13	8	
Scotland, W.	a	17	57	37	71
,,	b	40	27	34	
,,	c	27	10	18	
,,	d	16	6	11	
England, N.W.	a	34	53	44	70
,,	b	33	20	26	
,,	c	20	10	15	
,,	d	13	17	15	
England, S.W.	a	47	47	47	79
,,	b	33	30	32	
,,	c	17	10	13	
,,	d	3	13	8	
Ireland, N.	a	40	67	54	77
,,	b	33	13	23	
,,	c	10	17	13	
,,	d	17	3	10	
Ireland, S.	a	33	53	43	80
,,	b	37	37	37	
,,	c	13	7	10	
,,	d	17	3	10	

SUMMARY.

British Isles	a	38	50	44	75
,,	b	34	27	31	
,,	c	15	17	16	
,,	d	13	6	9	
British Isles	a	41	54	48	78
,,	b	35	25	30	
,,	c	15	11	13	
,,	d	9	10	9	

Reported—That the following cheques had been drawn during the month of February :—

1884.		£	*s.*	*d.*
2nd Feb.	For weekly salaries - - - - -	28	11	11
6th ,,	Pall Mall Coal Co., coals - - - - -	5	10	0
,, ,,	Kew Committee, waxed paper - - - -	10	0	0
,, ,,	W. C. Ley, inspections - - - - -	25	17	11
,, ,,	J. C. Ramsay, care of Bermuda Anemometer - -	4	12	0
	Carried forward - - -	£74	11	10

			£	s.	d.
1884.		Brought forward - - -	74	11	10
9th Feb.		For weekly salaries - - - - -	28	11	11
16th	„	„ „ - - - - -	28	11	11
„	„	Postmaster General, telegrams - - - -	234	3	11
„	„	"Shipping and Mercantile Gazette," private wire at Prawle Point - - - - - -	17	0	0
23rd	„	For weekly salaries - - - - -	31	1	5
„	„	A. J. Hodges, Council income tax - - -	20	16	8
„	„	Postmaster General, private wire - - - -	22	0	0
„	„	R. Strachan, aneroid (commissions, &c.) - - -	4	4	0
29th	„	R. H. Scott, salary - - - - -	66	13	4
„	„	J. S. Harding, junr., salary - - - -	27	15	6
„	„	T. D. Bell, salary - - - - - -	14	8	10
„	„	J. E. Cullum (Valencia), salary - - - -	16	13	4
„	„	R. H. Curtis -	22	4	5
„	„	J. A. Curtis -	16	3	7
„	„	T. E. Allen -	15	11	1
„	„	C. H. Thompson - Discussion, &c. of observations - -	11	3	4
„	„	H. N. Cobley -	10	5	11
„	„	E. G. Aldridge -	7	16	8
„	„	F. Gaster -	30	4	0
„	„	F. J. Brodie -	19	15	10
„	„	G. G. Francis - Preparation, &c. of Weather Reports -	19	13	0
„	„	A. J. Rigby -	15	0	0
„	„	R. Sargeant -	13	2	1
„	„	Capt. H. Toynbee - - -	33	6	8
„	„	Nav. Lieut. C. W. Baillie, R.N. -	20	16	8
„	„	R. Strachan - - - Discussion of observations and care of instruments.	27	15	6
„	„	C. Harding - - -	22	4	5
„	„	H. Harries - - -	13	6	8
„	„	W. Allingham - - -	13	6	8
„	„	W. G. James - - -	9	12	0
„	„	F. Hatchett, manifold copying plates - - -	3	6	0
„	„	Kew Committee, waxed paper - - - -	10	0	0
„	„	Stationery Office, sale of forms - - - -	2	0	3
„	„	W. Allingham, collection of synchronous observations -	9	11	11
„	„	F. Dangerfield, blocks for Barometer Manual - -	7	10	0
„	„	J. S. Harding, junr., petty cash - - - -	50	0	0
			£990	9	4

116, *Victoria Street, March* 26, 1884.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 5) were read and confirmed.

Read—The following correspondence (Minutes, February 19) :—

(M.O. 440.) Scottish Meteorological Society, Edinburgh,
February 18, 1884.

DEAR SIR,

I HAVE laid your letter of the 1st instant, before the Directors of the Ben Nevis Observatory, and I am requested by them to state that they are anxious to afford the Meteorological Council every facility in obtaining information from the observatory.

In making the arrangements with the Press Association, that Association was fully informed of the wishes of the Meteorological Council, as stated in your letter of December 3, 1883, and the Directors are of opinion that the agreement which has been concluded will in no way interfere with the Meteorological Council receiving all the information they desire. However, should it be found in practice that this arrangement with the Press Association in anyway interferes with the scientific usefulness of the observations taken at the observatory to the Meteorological Council, the Directors will carefully consider the matter in reviewing the agreement with the Association in November next. If the Meteorological Office desires a copy of the agreement with the Press Association, the Directors will be glad to forward it.

Yours, &c.
(Signed) ALEXANDER BUCHAN,
Secretary.

To R. H. Scott, Esq., Secretary,
Meteorological Council.

P.C. 440.
(M.O. 288.)

DEAR SIR, Meteorological Office, February 21, 1884.

WITH reference to my letter of yesterday, and to your circular claiming *exclusive* right to publish reports from Ben Nevis, I beg to inform you that this Office claims the right to publish such reports, by arrangement with the Scottish Meteorological Society. I shall be obliged, therefore, if you will state in writing, with a view of preventing any possible complications in future, that you recognise the right of this Office to make scientific use of the Ben Nevis observations, by their publication, when deemed advisable, with other meteorological reports issued by this Office.

Yours, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Manager, Press Association.

(M.O. 479.)

DEAR SIR, Press Association, London, February 22, 1884.

I HAVE to acknowledge receipt of yours of the 21st (No. 288). I have placed myself in communication with the Secretary of the Scottish Meteorological Society respecting the demand made by you, that the Meteorological Office claims the right to publish the reports from Ben Nevis. The agreement entered into between the Scottish Meteorological Office and the Press Association explicitly states that the Press Association is to have the exclusive right of immediately publishing the reports issued from Ben Nevis. We have no objection to your using the information for scientific purposes, but under no circumstances can the Press Association agree to the reports from Ben Nevis being incorporated in your daily meteorological compilation issued to the press.

Yours, &c.
(Signed) E. ROBBINS,
Manager.

R. H. Scott, Esq., Meteorological Office.

P.C. 460.
(M.O. 479.)

SIR, Meteorological Office, February 23, 1884.

I BEG to acknowledge receipt of your letter of yesterday, which shall be laid before the Meteorological Council.

Your view of the case is distinctly contrary to our arrangements with the Scottish Meteorological Society, as shown by their letter of the 18th instant, and I will at once communicate with the Society with the view of getting the matter put right.

Yours, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Manager, Press Association.

P.C. 462.
(M.O. 479.)

DEAR MR. BUCHAN, Meteorological Office, February 23, 1884.

BY instructions from the Council I wrote to the Press Association with reference to the Ben Nevis Reports. The letter I have received from them to-day is so unsatisfactory that I must ask you to request the Directors to give the matter their immediate attention.

It is, of course, understood that for the contribution we make to the observatory we are at liberty to receive and publish any telegraphic information we may from time to time request Mr. Omond to forward.

We are only awaiting the result of your discussion to decide as to the receipt of daily telegrams.

If we get these we should embody them in our reports, and this is what the Press Association seek to prohibit.

Yours, &c.
(Signed) ROBERT H. SCOTT.

(M.O. 729.) Scottish Meteorological Society, Edinburgh,
March 19, 1884.

DEAR SIR,

I HAVE submitted your letter of February 23rd to the Directors and am instructed to ask your attention to the following points:—1. The Meteorological Council, in their letter dated February 17, 1879, agreed to contribute 100*l.* a year towards the expenses of an observatory on Ben Nevis, on condition that copies of the observations be regularly communicated to the Meteorological Office, and accordingly since the observations began to be made copies of them have been regularly forwarded to the Meteorological Office, after being received by this office. 2. In a letter, dated November 16th, 1883, the Directors asked the Meteorological Council if they desired to have observations from Ben Nevis and Fort William telegraphed daily to their Office. In reply, December 3rd, 1883, it was stated that regular daily telegrams were not then wished for, on the ground that the cost of three a day from Ben Nevis and Fort William would be about 120*l.* a year, and that the Meteorological Council wished to wait at least till the results of Mr. Buchan's discussion of the Ben Nevis observations were published. 3. At the same time it was arranged in compliance with a wish expressed by the Meteorological Council that Mr. Omond should send occasional telegrams to the Meteorological Office whenever any striking change of conditions or special phenomenon of great interest occurred. The information sent in these occasional telegrams the Meteorological Office is of course at liberty to publish. 4. From all sides, and especially from newspapers, the Directors received urgent requests for a published daily weather report, and they were fully alive to the desirability of meeting this demand, but with the very limited staff at the disposal of the Scottish Meteorological Society, it was impossible for them to attempt the distribution of the report. At this stage the Press Association applied for a daily weather report (thermometer, barometer, &c. at 9 a.m. and 9 p.m.), and undertook to circulate it among the subscribing newspapers, and to pay to the end of December next, for such a limited report, at the rate of 100*l.* annually. As there is a probability of this sum being increased in future years, the Directors, in performance of their duty to the observatory, did not think it right to lose sight of this source of income, especially as experience has shown that the annual outlay in maintaining the observatory will be considerably greater than was anticipated. The Directors think it should be kept in mind that the object we all have in view is that these observations be fully and carefully recorded, and to secure this object it is indispensable that the observatory be efficiently maintained. Although the Press Association have the right for the rest of this year to exclusive publication of a daily weather report of the limited character mentioned above, the Directors do not see why the Meteorological Office may not, even this year, be furnished with a daily weather report direct from the observatory, not for immediate publication, but for use in the Office. I am, therefore, directed to say that, if additional information is desired by the Meteorological Office to that which Mr. Omond sends, in accordance with the instructions he has received from the Directors, they will be glad, on being informed of what is wanted, to instruct Mr. Omond to supply it.

I am further requested to say that the Directors are most anxious to take into consideration any proposal the Meteorological Council may desire to make, with the view of giving every assistance in their power.

Yours, &c.
(Signed) ALEXANDER BUCHAN.

R. H. Scott, Esq., Secretary,
Meteorological Council.

P.C. 708.
(M.O. 729.)

DEAR SIR, Meteorological Office, March 21, 1884.

WITH reference to previous correspondence upon the publication of the Ben Nevis reports, I am directed by the Meteorological Council to send you the following extract from a letter just received from the Scottish Meteorological Society upon the subject:—

"At the same time it was arranged, in compliance with a wish expressed by the Meteorological Council, that Mr. Omond should send occasional telegrams to the Meteorological Office whenever any striking change of conditions or special phenomenon of great interest occurred. The information sent in these occasional telegrams the Meteorological Office is of course at liberty to publish."

I enclose a copy of the Daily Weather Report and of the "Times," showing how these occasional telegrams are utilized and published, and I shall be obliged if you will let me know whether you

raise any objection to their publication in this way. If there should be any objection, perhaps you will be good enough to state it to the Scottish Society.

Yours, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Mana er, Press Association.

Resolved—That the sum of 100*l.* be granted to the Scottish Society for the Ben Nevis Observations for the year 1883–84.

Read—The following letter :—

(M.O. 739.)

Elswick Works, Newcastle-upon-Tyne,
March 19, 1884.

DEAR SIR,

IN accordance with my promise I send you the following report of experiments at high angles of elevation with the view of ascertaining the direction of the wind in the higher strata of the atmosphere.

Firing practice at high angles of elevation, to ascertain height of burst.

7-pr. jointed gun, mounted on a wooden carriage, especially arranged for high angle fire.

Angle of elevation 74°. Fuze set at 3·5 ins. Two observers with quadrants, and two with time-of-flight instruments, all near the gun.

No. 1 round :—

Angles observed with quadrants { No. 1 observer 70° / „ 2 „ 67° } Mean 68° 30′.

Time from moment of firing to sound of burst of shell being heard, 16·7 seconds.

No. 2 round :—

Angle observed with quadrants	- Both observers 70°.	
Time from gun fire to burst of shell	- - -	9·3 seconds.
Time from burst to sound being heard	- - -	7·0 „
Total	- - -	16·3 „

The puff was very distinct and clear, and remained visible for several minutes, during which its course as shown in sketch could be easily traced. *See* Figs. 1 and 2.

FIG. 1.

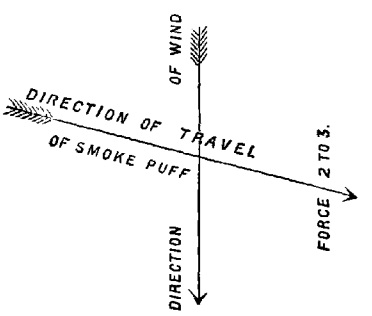


FIG. 2.

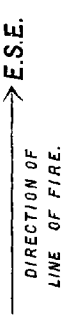
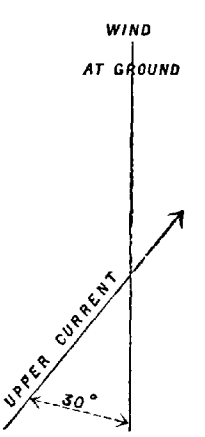


FIG. 3.



Time of observation, 3.30 p.m., blue sky with slight cirrus clouds.

The result in distance of burst is 1,142 × 7 = 7,994 ft. which, as hypothenuse of a right-angled triangle, one of whose angles is 70°, gives the perpendicular height of the cloud as 7,512 ft. or 2504 yards.

Three rounds with fuzes set at 3·5 inches. Time from burst to sound 7·6 seconds.

Angle between burst and horizon 67½°.

This gives an hypothenuse of 8,679 feet and a vertical height of burst of 8,016 feet or 2,672 yards.

Two rounds with fuze set at 4·8 inches. Time from burst to sound 9·3 seconds.

Angle between burst and horizon, 67°.

This gives an hypothenuse of 10,621 feet and a vertical height of burst of 9,777 feet or 3,259 yards.

The smoke puff remained visible for a considerable time. Time of observation, 3.20 to 4 p.m., sky cloudless. *See* Fig. 3.

The observations were taken as on August 23rd, *i.e.*, by independent observers with quadrants; time taken by stop watch.

Believe me, &c.
(Signed) W. NOBLE.

R. H. Scott, Esq., M.A., F.R.S.,
&c. &c. &c.
London.

Mr. Galton was requested to communicate with Captain Noble on the subject.

Submitted—The following reports on the Forecasts for January and February 1884:

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JANUARY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	30	48	39	78
,,	b	48	30	39	
,,	c	13	13	13	
,,	d	9	9	9	
Scotland, E.	a	35	39	37	68
,,	b	39	22	31	
,,	c	13	17	15	
,,	d	13	22	17	
England, N.E.	a	52	36	44	78
,,	b	28	40	34	
,,	c	16	20	18	
,,	d	4	4	4	
England, E.	a	48	56	52	82
,,	b	36	24	30	
,,	c	16	8	12	
,,	d	0	12	6	
Midland Cos.	a	48	52	50	86
,,	b	32	40	36	
,,	c	16	0	8	
,,	d	4	8	6	
England, S.	a	52	44	48	86
,,	b	40	36	38	
,,	c	4	8	6	
,,	d	4	12	8	
Scotland, W.	a	22	52	37	76
,,	b	52	26	39	
,,	c	17	18	18	
,,	d	9	4	6	
England, N.W.	a	36	44	40	74
,,	b	36	32	34	
,,	c	24	16	20	
,,	d	4	8	6	
England, S.W.	a	44	48	46	86
,,	b	40	40	40	
,,	c	8	4	6	
,,	d	8	8	8	
Ireland, N.	a	48	60	54	86
,,	b	36	28	32	
,,	c	8	12	10	
,,	d	8	0	4	
Ireland, S.	a	40	52	46	78
,,	b	40	24	32	
,,	c	12	16	14	
,,	d	8	8	8	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecasts.	Percentage of Success a + b.
Scotland, N.	a	21	46	34	76
,,	b	42	42	42	
,,	c	25	4	14	
,,	d	12	8	10	
Scotland, E.	a	38	38	38	63
,,	b	25	25	25	
,,	c	16	16	16	
,,	d	21	21	21	
England, N.E.	a	43	47	45	77
,,	b	32	32	32	
,,	c	14	14	14	
,,	d	11	7	9	
England, E.	a	46	46	46	82
,,	b	43	29	36	
,,	c	7	14	11	
,,	d	4	11	7	
Midland Cos.	a	36	57	47	92
,,	b	54	36	45	
,,	c	7	4	5	
,,	d	3	3	3	
England, S.	a	61	54	58	90
,,	b	32	32	32	
,,	c	0	7	3	
,,	d	7	7	7	
Scotland, W.	a	21	50	36	71
,,	b	42	29	35	
,,	c	21	17	19	
,,	d	16	4	10	
England, N.W.	a	26	30	28	76
,,	b	44	52	48	
,,	c	15	11	13	
,,	d	15	7	11	
England, S.W.	a	32	36	34	84
,,	b	50	50	50	
,,	c	11	3	7	
,,	d	7	11	9	
Ireland, N.	a	64	54	59	84
,,	b	14	36	25	
,,	c	11	7	9	
,,	d	11	3	7	
Ireland, S.	a	43	50	47	79
,,	b	28	36	32	
,,	c	18	7	12	
,,	d	11	7	9	

SUMMARY.

British Isles	a	41	48	45	80
,,	b	39	31	35	
,,	c	13	12	12	
,,	d	7	9	8	
British Isles	a	39	46	43	79
,,	b	37	36	36	
,,	c	13	10	12	
,,	d	11	8	9	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success).
c partial failure.
d total failure.

FEBRUARY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	44	54	49	79
,,	b	30	29	30	
,,	c	17	9	13	
,,	d	9	8	8	
Scotland, E.	a	35	42	39	71
,,	b	35	29	32	
,,	c	21	21	21	
,,	d	9	8	8	
England, N.E.	a	22	29	26	75
,,	b	48	50	49	
,,	c	26	8	17	
,,	d	4	13	8	
England, E.	a	29	38	34	82
,,	b	54	42	48	
,,	a	9	12	10	
,,	b	8	8	8	
Midland Cos.	a	13	42	28	82
,,	b	62	46	54	
,,	c	13	8	10	
,,	d	12	4	8	
England, S.	a	38	46	42	73
,,	b	33	29	31	
,,	c	25	8	17	
,,	d	4	17	10	
Scotland, W.	a	26	46	36	70
,,	b	43	25	34	
,,	c	22	17	20	
,,	d	9	12	10	
England, N.W.	a	38	46	42	86
,,	b	50	38	44	
,,	c	0	12	6	
,,	d	12	4	8	
England, S.W.	a	46	50	48	86
,,	b	38	38	38	
,,	c	16	12	14	
,,	d	0	0	0	
Ireland, N.	a	50	63	57	80
,,	b	21	25	23	
,,	c	21	4	12	
,,	d	8	8	8	
Ireland, S.	a	54	75	65	84
,,	b	25	13	19	
,,	c	13	8	10	
,,	d	8	4	6	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	39	48	44	78
,,	b	36	33	34	
,,	c	21	15	18	
,,	d	4	4	4	
Scotland, E.	a	38	36	37	76
,,	b	31	46	39	
,,	c	28	7	17	
,,	d	3	11	7	
England, N.E.	a	48	42	45	74
,,	b	24	34	29	
,,	c	17	7	12	
,,	d	11	17	14	
England, E.	a	24	38	31	74
,,	b	45	41	43	
,,	c	21	14	18	
,,	d	10	7	8	
Midland Cos.	a	42	31	37	75
,,	b	31	45	38	
,,	c	24	3	13	
,,	d	3	21	12	
England, S.	a	38	38	38	78
,,	b	38	41	40	
,,	c	17	14	15	
,,	d	7	7	7	
Scotland, W.	a	25	36	31	65
,,	b	32	36	34	
,,	c	36	18	27	
,,	d	7	10	8	
England, N.W.	a	36	36	36	77
,,	b	43	39	41	
,,	c	18	11	15	
,,	d	3	14	8	
England, S.W.	a	48	48	48	78
,,	b	31	28	30	
,,	c	14	17	15	
,,	d	7	7	7	
Ireland, N.	a	55	68	62	85
,,	b	35	11	23	
,,	c	3	7	5	
,,	d	7	14	10	
Ireland, S.	a	45	61	53	79
,,	b	31	21	26	
,,	c	10	4	7	
,,	d	14	14	14	

SUMMARY.

British Isles	a	36	48	42	79
,,	b	40	33	37	
,,	c	17	11	14	
,,	d	7	8	7	
British Isles	a	40	44	42	76
,,	b	34	34	34	
,,	c	19	11	15	
,,	d	7	11	9	

SUBMITTED—The following STATEMENT respecting the RECORDS for May 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

——	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :— Action	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good	Direction. Good.	Velocity. Good.	¶ Direction. Good.	¶ Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good.	Direction. Good	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	*3	†1	0	0	0	0	0	0	0
Orientation verified	27th	—	31st	—	13th	—	29th	—	6th	—	23rd	—	15th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	2	0	1	0	0	0	0	0
„ „ irregular differences	0	2	0	4	0	0	0	2	2	0	0	0	0	12
Result of 40 *Remeasurements* :—														
Greatest difference	1·0	2·0	0·0	2·0	0·0	2·0	1·0	1·0	0·0	1·0	1·0	1·0	0·0	3·0
Mean difference irrespective of sign	0·0	0·5	0·0	0·5	0·0	0·5	0·0	0·5	0·0	0·4	0·1	0·4	0·0	0·7
Residual difference (— Meteorological Office)	0·0	0·0	0·0	0·0	0·0	−0·1	0·0	−0·1	0·0	+0·1	0·0	0·0	0·0	+0·1
RAIN GAUGE :— Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
„ „ other causes	0		0		0		‡5		0		0		0	
Errors in tabulation	0		2		0		10		5		0		0	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Do.	Indifferent.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	3 hrs.	0
„ „ other causes	0	0	0	0	§7	0	0
No. of errors discovered—							
In entry of standard	0	3	1	1	0	1	0
„ calculating residual correction	0	0	0	6	0	0	0
„ applying residual correction	1	0	0	7	1	1	1
„ subtraction in subsidiary tables	0	0	1	1	1	4	1
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	1	1	2	1	0	1	0
Result of 40 *Remeasurements :—*							
Greatest difference	0·004	0·008	0·005	0·005	0·005	0·005	0·009
Mean difference irrespective of sign	0·002	0·002	0·002	0·002	0·002	0·002	0·002
Residual difference (— Meteorological Office)	−0·001	+0·001	0·000	0·000	+0·001	0·000	−0·001
Mean monthly difference between simultaneous barograph and barometer readings	0·002	0·002	0·001	0·002	0·002	0·001	0·001

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Indifferent.		Do.		Do.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	7 hrs.	7 hrs.	0	0	0	0	0	0	1 hr.	1 hr.	0	0
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	0	0	0	1
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0	—	0	—	40	—	1
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	‖4	‖3	0	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	31	36	0	2	0	5	0	0	0	0	0	0
„ „ by subsidiary measurements	0	0	0	0	1	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	0	0	1	1	0	2	2	2	0	2	0	1
„ „ detected under glass scale	0	0	0	1	0	0	0	1	0	0	0	0	4	3
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·2	0·2	0·2	0·3	0·3	0·2	0·2	0·2	0·2	0·3	0·2	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (— Meteorological Office)	−0·1	+0·1	0·0	0·0	+0·1	−0·1	+0·1	0·0	0·0	−0·1	0·0	0·0	−0·1	−0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·3	0·1	0·2	0·1	0·2	0·2	0·2
No. of errors in maxima and minima	0	—	3	—	2	—	2	—	2	—	3	—	3	—

* Clips not properly secured. † Trace invisible. ‡ Pencil interfered with. § Light stop failed to act. ‖ Photographic imperfections. ¶ After re-tabulation.

SUBMITTED—The following STATEMENT respecting the RECORDS for June 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	¶ Direction. Good.	¶ Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Action														
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	6	7	0	0	0	0
„ „ other causes	0	0	0	0	{*14 §1}	*15	0	0	{†1 ‡1}	†3	0	0	0	0
Orientation verified	30th	—	30th	—	9th	—	30th	—	12th	—	19th	—	13th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	1	0	1	1	4	2	0	0	0	0	9
Result of 40 *Remeasurements* :—														
Greatest difference	0·0	1·0	0·0	1·0	0·0	1·0	0·0	1·0	2·0	1·0	0·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·4	0·0	0·3	0·0	0·3	0·0	0·4	0·1	0·5	0·0	0·3	0·0	0·7
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	−0·1	0·0	−0·1	0·0	−0·2	−0·1	−0·2	0·0	−0·1	0·0	−0·2
RAIN GAUGE :—														
Action	Good.		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		13 hrs.		0		0		0		29 hrs.	
„ „ other causes	0		0		‖24 hrs.		0		0		0		0	
Errors in tabulation	0		4		1		5		2		8		1	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Indifferent.	Indifferent.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	1	0	0	0
„ „ failure of light	0	3 hrs.	0	0	0	0	7
„ „ other causes	0	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	5	1	0	5	0	0
„ calculating residual correction	0	0	1	5	0	0	0
„ applying residual correction	0	2	0	3	0	0	0
„ subtraction in subsidiary tables	0	0	0	0	4	3	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	1	0	0	0	1	0
Result of 40 *Remeasurements :—*							
Greatest difference	·004	·005	·005	·005	·006	·005	·006
Mean difference irrespective of sign	·002	·002	·002	·002	·002	·002	·002
Residual difference (—Meteorological Office)	·000	·000	+·001	·000	·000	+·001	—·001
Mean monthly difference between simultaneous barograph and barometer readings	·002	·003	·001	·002	·002	·001	·001

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Indifferent.		Do.		Do.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	3	5	0	0	0	0	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	1	—	0	—	0	—	3	—	1
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	††3	**1 ††3	0	0	0	0	‡‡2	§§20	0	0	††1	††1
No. of errors discovered in entry of standard	0	0	0	0	0	0	2	0	0	2	2	1	0	0
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	1	0	0
„ „ of subtraction in do. tables	0	0	0	0	0	0	0	2	2	0	0	1	2	1
„ „ detected under glass scale	0	0	0	0	0	0	1	1	1	1	0	0	0	0
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·2	0·2	0·3	0·3	0·2	0·2	0·2	0·3	0·3	0·2	0·2	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	−0·1	0·0	+0·1	−0·1	0·0	−0·1	+0·1	−0·1	0·0	0·0	−0·1	−0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·3	0·2	0·2	0·1	0·2	0·2	0·3
No. of errors in maxima and minima	0	—	5	—	3	—	3	—	3	—	6	—	4	—

* Clips not properly secured. § Pencils not lifted. ‖ Pencil deficient in pressure. † Repairing instrument. ‡ Visitors. ** Photographic imperfections.
†† Imperfect action of light-stop. ‡‡ Instruments dismounted. §§ Instrument broken. ¶ After re-tabulation.

SUBMITTED—The following STATEMENT respecting the RECORDS for July 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	¶ Direction. Good.	¶ Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Action														
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orientation verified	—	—	31st	—	24th	—	29th	—	—	—	26th	—	17th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	1	0	0	0
„ „ irregular differences	0	0	0	5	0	5	1	1	2	2	0	1	3	17
Result of 40 *Remeasurements*:—														
Greatest difference	1·0	1·0	0·0	2·0	0·0	1·0	1·0	1·0	1·0	2·0	0·0	1·0	0·0	2·0
Mean difference irrespective of sign	0·1	0·4	0·0	0·7	0·0	0·3	0·0	0·4	0·1	0·4	0·0	0·3	0·0	0·5
Residual difference (—Meteorological Office)	+0·1	−0·1	0·0	−0·1	0·0	0·0	0·0	0·0	0·0	−0·1	0·0	−0·1	0·0	−0·1

RAIN GAUGE:—							
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0
Errors in tabulation	1	3	0	6	2	1	1

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Indifferent.	Bad.	Do.	Do.	Indifferent.
Records deficient, due to stoppage of clock	0	0	0	18	0	0	2 hrs.
„ „ failure of light	0	0	9	0	0	0	0
„ „ other causes	0	*30	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	2	0	11	0	2	0
„ calculating residual correction	0	1	0	5	0	0	0
„ applying residual correction	0	3	0	3	1	0	0
„ subtraction in subsidiary tables	0	0	0	0	0	1	1
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	2	0	1	1	1	0
Result of 40 *Remeasurements :—*							
Greatest difference	·003	·005	·005	·007	·007	·005	·007
Mean difference irrespective of sign	·002	·002	·002	·002	·003	·002	·002
Residual difference (—Meteorological Office)	·000	·000	·000	—·001	—·001	·000	+·001
Mean monthly difference between simultaneous Barograph and Barometer readings	·002	·002	·001	·002	·002	·001	·001

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Bad.		Indifferent.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	4	0	0	0	0	0	0	0	1
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0	—	0	—	24	—	0
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	†1 *8	*12	0	0	0	0	0	0	‡1	‡1	0	0
No. of errors discovered in entry of Standard	0	0	2	6	5	4	3	2	1	0	6	7	2	1
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	1	0	1	2	0	0	7	2	2	7	0	1	1	3
„ „ detected under glass scale	0	0	0	1	1	0	0	1	2	3	0	1	3	1
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·2	0·2	0·3	0·2	0·2	0·2	0·2	0·2	0·2	0·3	0·4	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	0·0	+0·1	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	—0·1	—0·1
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·3	0·1	0·2	0·1	0·2	0·1	0·3
No. of errors in maxima and minima	0	—	5	—	0	—	4	—	3	—	4	—	4	—

* Imperfect action of light-stop. † Photographic imperfections. ‡ Curve changed too near the hour. ¶ After retabulation.

SUBMITTED—The following STATEMENT respecting the RECORDS for August 1882, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	¶ Direction. Good.	¶ Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Action														
Records deficient, due to stoppage of clock	0	0	0	0	9	10	0	0	0	0	0	0	0	0
,, ,, other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orientation verified	—	—	30th	—	19th	—	—	—	—	—	26th	—	8th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, irregular differences	0	1	1	0	2	2	3	0	0	2	0	2	7	13
Result of 40 *Remeasurements*:—														
Greatest difference	1·0	2·0	1·0	1·0	1·0	2·0	1·0	1·0	1·0	3·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·4	0·0	0·2	0·0	0·5	0·1	0·4	0·0	0·5	0·0	0·4	0·0	0·5
Residual difference (— Meteorological Office)	0·0	0·0	0·0	−0·1	0·0	−0·1	+0·1	−0·1	0·0	0·0	0·0	−0·1	0·0	+0·1
RAIN GAUGE:—														
Action	Good		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		10 hrs.		0		0		0	
,, ,, other causes	0		*24		0		0		0		0		0	
Errors in tabulation	0		3		1		6		9		0		2	

BAROGRAPH :—							
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Indifferent.	Bad.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	0	1 hr.	0	0	0	0
„ „ other causes	0	†2 hrs.	0	0	0	0	0
No. of errors discovered—							
In entry of standard	1	3	8	33	7	1	0
„ calculating residual correction	0	0	1	6	0	1	0
„ applying residual correction	1	15	0	4	1	1	3
„ subtraction in subsidiary tables	0	0	0	0	4	0	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	2	2	3	1	10	0
Result of 40 *Remeasurements :—*							
Greatest difference	0·006	0·006	0·005	0·005	0·005	0·005	0·005
Mean difference irrespective of sign	0·002	0·002	0·003	0·002	0·002	0·002	0·002
Residual difference (— Meteorological Office)	+0·001	0·000	0·000	0·000	0·000	0·000	—0·001
Mean monthly difference between simultaneous barograph and barometer readings	0·001	0·003	0·001	0·002	0·002	0·001	0·002

THERMOGRAPH :—														
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Indifferent.		Indifferent.		Do.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	1	—	3	—	0	—	1	—	0	—	1	—	0
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	†13	†14	0	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	1	1	1	1	0	0	1	4	0	0	0	0
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	0	0	1	2	0	0	2	6	1	0	2	2
„ „ detected under glass scale	0	0	3	0	0	1	0	0	2	0	1	0	2	0
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·2	0·2	0·3	0·4	0·3	0·2	0·3	0·2	0·3	0·2	0·3	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (— Meteorological Office)	0·0	+0·1	0·0	0·0	+0·1	−0·1	+0·1	0·0	0·0	0·0	−0·1	0·0	−0·1	−0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·3	0·2	0·2	0·1	0·1	0·2	0·3
No. of errors in maxima and minima	0	—	6	—	7	—	5	—	2	—	6	—	1	—

* Funnel choked. † Shutter stopped clock. ¶ After re-tabulation.

On the motion of the Hydrographer, it was resolved that a cheque for 10*l.* 10*s.* be presented to Staff-Commander J. C. Richards for assistance rendered in revising the Barometer Manual for Seamen.

Read—A letter (No. 710) from Major Templer, proposing to exhibit apparatus which he had devised for captive balloon ascents.—Offer declined.

The preface to the charts of Sea Surface Temperature for the three oceans (Minutes 1882, p. 56) was adopted, with certain verbal corrections.

Read—The following letter :—

(M.O. 622.) 21, Chapel Street, Belgrave Square, London, S.W.,
March 10, 1884.

DEAR MR. SCOTT,

REFERRING to yours of March 8th, I hereby enclose all the photographs, nine in number, which I have already taken.

In accordance with your request I have marked the set of the camera approximately in each, and have also added a memorandum of the shape of isobars with which each kind of cloud was associated.

I have only just begun to take photos for a book of my own, but as I shall have to give a great deal of time to it, I should be very glad to be able to combine my own series with any research on the subject of clouds which your Council may be in want of.

You are doubtless aware of the great practical difficulties in the way of cloud photography. The photos in Hildebrandsson's book on Clouds took a professional photographer six years to collect. Probably with the use of gelatine plates I might get a pretty good series in a year.

Yours, &c.

R. H. Scott, Esq., F.R.S., Secretary, Meteorological Council. (Signed) R. ABERCROMBY.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 14 logs had been received, 10 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. T. Alderton -	S.S. "Australia"	July 25, 1883—Feb. 7, 1884.	Australia, India, and home, viâ Suez.	1883, p. 75.
Capt. A. E. Barlow	S.S. "Paramatta"	Nov. 8, 1883—March 6, 1884.	London, Sydney, and home, viâ Suez.	1883, p. 54.
Capt. E. C. Bennett	"Thessalus" -	June 23, 1883—March 5, 1884.	London, Calcutta, home -	1883, p. 13.
Capt. F. B. Bouchette	S.S. "Montreal"	Aug. 24, 1883—March 20, 1884.	Liverpool and Canada, three voyages.	1871, p. 3.
Capt. F. H. Crotty -	"Evesham Abbey."	Feb. 8, 1883—Feb. 14, 1884.	London, Sydney, San Francisco.	—
Capt. G. Denman -	S.S. "Earl King"	May 29—Dec. 13, 1883.	Sydney, C.B., London, Quebec.	1883, p. 54.
Capt. W. H. Kidley	S.S. "Coptic" -	Nov. 23, 1882—Feb. 21, 1884.	San Francisco, Japan, Hong Kong (several voyages).	1881, p. 113.
Lieut. Com. W. U. Moore, R.N., Sub.-Lieut. R. P. Adams, R.N.	H.M.S. "Dart"	April 25—Dec. 19, 1883.	Fiji Islands, and Sydney	1883, p. 54.
Lieut.-Com. C. F. Oldham, R.N., Lieut. A. Leeper, R.N.	H.M.S. "Lark"	June 10—Oct. 11, 1883.	Australian Station -	1883, p. 99.
Capt. R. Peebles -	Barque "Tweedsdale."	June 17, 1883—March 5, 1884.	Cardiff, Calcutta, home -	1883, p. 13.

Mr. Scott was instructed to present the charts (O. 27) to Captain Crotty, and to convey the best thanks of the Council to the other observers.

LONDON: Printed by EYRE and SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.
[320.—25.—4/84.]